ENVIRONMENTAL ASSESSMENT

DD(X) RADAR TEST FACILITY Construction and Use

At

Surface Combat Systems Center

Tenant of

National Aeronautic and Space Administration

Goddard Space Flight Center

Wallops Flight Facility

Wallops Island, Accomack County, Virginia 23337

Program Executive Office SHIPS

U.S. Department of the Navy

Environmental Assessment

DD(X) Radar Test Facility Construction and Use At Surface Combat Systems Center

Tenant of Goddard Space Flight Center, Wallops Flight Facility
Wallops Island, Accomack County, Virginia 23337
Program Executive Office (PEO) Ships

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Abstract: The PEO Ships, Program Office (PMS 500) proposes to construct and operate a new test and evaluation (T&E) and training facility for the Dual Band Radar (DBR) and future related radars used by the DD(X) series of surface combat ships at the NASA Goddard Space Flight Center, Wallops Island, VA. The existing Navy facilities at Wallops Island cannot physically support these additional radars and combat systems equipment. The Department of Navy needs to conduct these T&E and training activities in a realistic environment to ensure that the systems developed for Fleet use function effectively and consistently in the combat environment for which they are intended and that all Fleet personnel are fully prepared to use the system during actual deployment. No significant unmitigated adverse environmental impacts on or off the facility are predicted.

Executive Summary

The Program Executive Office Ships (PEO Ships) proposes to construct and operate a Dual Band Radar (DBR) test and evaluation facility with complete communications capabilities for the DD(X) series of surface combat ships. The DBR consists of an X-Band Multi-Function Radar (MFR) and an S-Band Volume Search Radar (VSR). To ensure the successful installation and testing of the new systems aboard ship, this program will require a shore based test facility where radars and communications equipment can interact realistically with existing ship systems in a marine environment. Construction is expected to occur between the winter of 2004 and the summer of 2006. The facility is expected to operate for a minimum of 20 years.

The proposed DD(X) facility and radar support structure will be approximately 200 feet (61 meters) on each side with a height of approximately 135 feet (41 meters). The structure will be approximately 55,000 square feet (5,000 square meters) of office and multi-use facility, sitting on a total of 5.0 acres (2.0 hectare). The five (5) acres will be subdivided into a 2.5 acre (1 hectare) parking lot facility, approximately 1 acre (0.4 hectare) for the radar facility itself, with the remaining acreage for fire lanes, security setbacks, etc. There will also be approximately seven poles used as radar targets. These structures will be 100ft (30.5 m) tall or less. Two, one hundred-foot poles will be mounted upon mobile trailers and will move along existing roadways. The other poles are 90 feet (27.4 m) tall, collapsible, with a four-foot (1.2 m) diameter cement base. Power and signal cabling will be routed to take advantage of existing upland right of ways. A small power/signal junction panel will be located at the base of each of the Tower locations.

After investigating several alternatives, the PEO Ships proposes to conduct these activities at the Surface Combat Systems Center (SCSC), a tenant of the NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, VA. The presence of the Navy's AEGIS Combat Systems and the Ship Self Defense Systems (SSDS) on the island near the proposed site for the DD(X) system presents a unique opportunity to test not only within the marine environment of the island, but within the context of other ships operating together as a battlegroup as well. Wallops Island is located off the Delmarva Peninsula, in the Atlantic Ocean. NASA has used this area for many years for sub-orbital rocket launches and similar activities. The Navy, as a tenant of NASA, has also used the area for many years for testing of Navy combat

systems, much like the proposed testing. It is adjacent to lands under the jurisdiction of the Chincoteague National Wildlife Refuge and the Assateague National Seashore. This ready availability of high technology, with all the physical infrastructure and human skills required to support it, provides a unique opportunity to test the DBR and associated communications as well as its interoperability with other ships. At the same time, the lack of development in the vicinity not only enhances the security of the area, but provides an important insulation from concerns for public safety. Thus the wildness of the area becomes an asset in itself.

It is the purpose of this Environmental Assessment to evaluate any potential environmental impacts of this proposal and to either avoid, or to mitigate where necessary, any adverse impacts. The following alternatives were considered for the location of the proposed project on Wallops Island: construction and operation of the DBR at Alternative 1 (Site W-40); construction and operation of the DBR at Alternative 2 (north of V-24); construction and operation of the DBR at Alternative 3 (north end); and Alternative 4, the no action alternative.

Alternative 1 is located between NASA's launch range and Navy facilities similar in function to the proposed structure. This alternative would impact 2.1 acres of scrub-shrub wetland. This impact would be mitigated by creation of at least 3.2 acres of similar habitat on the northern end of the island.

Alternative 2 is located north of Navy facilities in an area currently undeveloped. This alternative would impact approximately 2 acres of saltmarsh wetlands interspersed with maritime forest. This loss would require mitigation which would have to be developed in consultation with the United States Army Corps of Engineers and the Virginia Department of Environmental Quality.

Alternative 3 is located on an undeveloped dune complex on the northern end of the island. This site could impact wild dunes. Consultation could be required with several agencies to determine impacts and seek mitigation measures.

Alternative 4 would require installation of untested equipment aboard deploying ships. Although not an environmental impact, this would represent a safety concern to the personnel aboard those ships.

The proposed action would have no effect on threatened or endangered species. No new permits other than for wetland impacts will be required. There will be no negative impacts

to air or water, farmlands, noise, cultural resources, or socioeconomic situation. Further consultation would be required for Alternatives 2 and 3, but no significant negative impacts are anticipated for any alternative which could not be mitigated.

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1 PURPOSE OF AND NEED FOR ACTION

1.1 Background Information

Naval warfare in the 21st Century has changed. As the challenges faced by the U.S. Navy in defense of our homeland and foreign interests continue to change and expand, so must the U.S. Navy change and expand, developing new technologies not yet imagined.

The purpose of this action is to provide a testing mechanism for the radar systems of the 21st Century Navy.

In the last decade, the Department of Defense (DoD)[1] has recognized that the primary threats have changed. Rather than open ocean warfare between world powers, we now face localized or regional conflicts around the globe, in addition to protecting the homeland from terrorist threats and ballistic missiles. U.S. response to such threats often requires warships stationed off foreign coasts in shallow ocean depths (littoral). These ships provide:

- a military presence,
- a launch platform for land attack missiles, non-guided, missile defense
- a launch platform for offensive or defensive aircraft, which may also require Navy ships as inshore protective shields,
- military operations and combat raids close to shore, or
- ability to detect, search, and track missiles, surface ships, and aircraft within a coastal combat environment.

The United States Navy's Sea Power 21 vision is a developing answer to that need. DD(X) (see Figure 1) is the centerpiece of a family of radically innovative ships that will operate within the construct of the Surface Combatant Navy. They will deliver a vast range of war fighting capabilities that will maximize and revolutionize the combat capability of the Fleet. The Dual Band Radar (DBR), the prime radar of the DD(X), is significantly advanced over technology currently in use. The DBR is comprised of the Multi-Function Radar (MFR), which is an X-band radar, which allows for a horizon search and the Volume Search Radar (VSR), which is an S-band radar, which performs long-range detection and tracking of airborne targets. The DD(X) program and the DBR provide the baseline on which continuing development of technology and engineering

[1] A list of acronyms is available at Appendix A.

can support the future Cruiser (CG(X)) and Aircraft Carriers (CVN-(X)). Since they will share radar and communications systems, all of these ships will be able to use the proposed site for long-term, shore-based, DBR testing and evaluation, training, and yet-to-be-defined lifetime & in-service support.

Figure 1: Artist's conception of the DD(X) Destroyer.

DD(X) will be a multi-mission surface combatant tailored to bring offensive, distributed, and precision firepower at long range in support of forces ashore. As a highly versatile “sea base,” DD(X) will provide independent forward presence and deterrence and operate as an integral part of multi-service and combined strike force operations abroad.

Prior to construction of the first DD(X) ship, the DBR must undergo land-based Test and Evaluation (T&E) activities under realistic maritime and operational conditions to evaluate its performance and ensure its effectiveness. At the same time, successful integration and compatibility of the radar with communication elements must be verified. Prior to and subsequent to deployment, operational Department of the Navy (DoN) personnel must be trained in use of these systems in realistic combat environments. Deployment of the first DD(X) ship to be outfitted with this DBR is proposed for 2011.

1.2 Summary of Specifications (T&E and Training Objectives)

The DoN needs to conduct these test and evaluation and training activities in a realistic environment to ensure that the systems developed for the Fleet are effective and consistent in the environment for which they are intended, and that all Fleet personnel are fully prepared to use the systems during actual deployment.

A realistic test and training environment includes the littoral area with all ocean effects and sea states that could potentially be encountered during deployment. Location proximate to other Surface Combatant test facilities is considered critical to providing the realistic networked

Battle Group environment required to fully test the Combat Systems of the future. It is proposed that the activities on the DBR will take place at the Navy's Surface Combat System Center, a tenant of NASA's Goddard Space Flight Center's, Wallops Flight Facility, on Wallops Island, Virginia. The environment must also be able to support realistic targets representative of the threat to be addressed by these future combatants.

Required support infrastructure includes complete shipboard-like systems and configurations to support testing and evaluation (T&E) and team and individual training; a full unrestricted radiating arc over air, sea and land space controlled by the United States for government use, data link and ship-to-shore communication to ensure successful integration with other systems at sea, and sufficient utilities and support facilities.

1.3 Summary of Proposed Action

The PEO Ships, DD(X) Program Office (PMS 500,) will conduct Test and Evaluation (T&E) activities on the DBR at a site on Wallops Island, Virginia where the Fleet can also conduct interoperability tests with other ships and airplanes and perform team and individual training for DD(X) personnel in a marine environment.

Since no facility currently exists which could meet the requirements of the proposed action, the PEO Ships also proposes to construct and use a facility capable of supporting the testing, evaluation, and training requirements of the program.

1.4 Decisions to be Made

The National Environmental Policy Act (NEPA) 1969 (Title 42 of the United States Code (USC) Section 4321 *et seq.*), the President's Council on Environmental Quality (CEQ) NEPA regulations (Title 40 of the Code of Federal Regulations (CFR) Sections 1500-1508), and the Navy regulation OPNAVINST 5090.1B (4 June 2003) and NASA Procedures and Guidelines (NPG 8580.1 all require that Federal agencies, including NASA and the Navy, consider the environmental impacts of their proposed actions as a contribution to informed decision-making. Under NEPA, the resultant analyses must be documented in either an Environmental Impact Statement (EIS) (for major Federal actions significantly impacting the environment), or in an Environmental Assessment (EA)[2]. An EA is a concise public document that contains the analysis for determining whether

[2] At SCSC, NEPA compliance is initiated with the NEPA Documentation Worksheet, Appendix B.

significant environmental impacts may occur, and therefore, whether to prepare an EIS. An EA results in preparation of either a Finding of No Significant Impacts (FONSI) or an EIS.

1.5 Compliance with Pertinent Environmental Laws and Executive Orders

Further compliance with the following laws and Executive Orders are not required for Alternative 1. Consultation would be required to determine compliance for Alternatives 2 and 3 and to develop mitigation for any impacts determined. For supporting rationale, see the sections of this EA in Chapter 3 indicated after each law and Executive Order. Required permits will be secured before construction commences.

Section 106 consultation under the National Historic Preservation Act

Executive Order “Floodplains Management” (EO 11988)

General Conformity Analysis under the Clean Air Act. NASA will secure the minor alterations required for the air permit.

Consistency determination under the Coastal Zone Management Act

Executive Order for “Protection of Wetlands” (EO 11990)

A wetland permit will be required; The Joint Permit Application has been submitted. The selected contractor will supply an erosion and sediment control plan, and a stormwater plan, as well as securing the permits.

Section 7 consultation under the Endangered Species Act

Marine Mammal Protection Act

Environmental Justice analysis under Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”

All radio frequency emitters to be installed on the new structure have or will have received their frequency allocations from the National Telecommunications and Information Administration (NTIA) prior to operation. Additionally, approval is required from the Joint Frequency Management Office, Atlantic prior to the operation of the DBR.

2 ALTERNATIVES

This chapter:

- Evaluates preliminary locations that were considered for conducting the proposed actions, required specifications and economic effectiveness with rationale for the selected site;
- Evaluates potential sites on Wallops Island with required specifications and rationale for the selected site.

2.1 Proposed Action

The Navy proposes to construct a long-term, land-based facility to conduct initial Test and Evaluation (T&E) activities on the Dual-Band Radar (DBR) and associated radio frequency (RF) emitters and combat systems for the DD(X) line of surface combatant ships. The proposed DD(X) facility and radar support structure will be approximately 200 feet (61 meters) on each side with a height of approximately 135 feet (41 meters). The structure will consist of approximately 55,000 square feet (5,000 square meters) of office and multi-use facility space. The main building and any associated outbuildings, except the boresite poles, will sit on a total of 5.0 acres. The 5 acres will be subdivided into a 2.5 acre parking lot facility, approximately one (1) acre for the radar facility itself, with the remaining acreage for fire lanes, security setbacks, etc.

Long term activities may include Lifetime Support Engineering, In-Service Engineering and Maintenance, and operator training for DD(X) sailors. Associated with the facility would be approximately seven poles at or under 100 feet (30.6 meters) high, located within 1,000 feet (306 meters) of the facility, but not within the five acre site. None of the poles are expected to be on wetlands, but will be placed on existing rights-of-way. Utility access will likely be along existing cleared uplands. Two poles will be mobile, moving along existing roads. The poles will support low-power RF target generating equipment.

This action requires a suitable maritime operating environment that supports interoperability tests with new and current ship combat systems. The full complement of integrated DD(X) systems components must support realistic research and development test events and training in all areas of detection, control, and engagement.

2.2 Preliminary Alternatives to the Proposed Action

The PEO Ships originally considered three land-based test sites and shipboard testing for conducting T&E activities and associated training for the DD(X) combat system, as well as the No Action alternative. The three preliminary land-based test site alternatives were Dam Neck, VA; Eglin AFB, FL; and Wallops Island, VA. In all cases the proposed sites were considered for long term, land based radar testing. Radar testing requirements are the principal determinant in site selection and site elimination, and are as follows:

Interoperability: The site is required to contain other, similar functions to permit testing of interactions with other ships and systems. These systems will all be required to operate together in the at-sea environment. Having them co-located at a single land-based test site enables this interoperability capability, thereby providing a significant advantage. The facility would also require direct access to the ocean in order to facilitate cooperative exercises with ships and aircraft.

Marine environment: The site is required to permit interaction with realistic marine conditions, to allow the fullest possible testing of the radar capability at sea.

Radiation Restrictions: The site needs to allow for at least 240° transmission arc, and a minimum of potential conflict with other functions, clutter, or development.

Infrastructure: Support facilities such as utilities, a trained workforce, and land access are also requirements for the proposed facility.

Dam Neck, VA was eliminated from the preliminary alternatives list due to restrictions on radiation and limitations on interoperability. Eglin AFB, Florida, was eliminated due to limitations and potential restrictions on radiation, coupled with insufficient interoperability. Shipboard testing best meets the test requirements for Marine Environment and Radiation. However, the limitations to nonexistent interoperability and infrastructure leave this as an unfeasible alternative.

Wallops Island, VA, best meets the radar testing requirements discussed above. The other preliminary locations are eliminated from further review as they do not meet the broad requirements of the proposed facility.

2.3 Dimensions of the Proposed Project

The proposed DD(X) facility and radar support structure will be approximately 200 feet (61 meters) on each side with a height of approximately 135 feet (41 meters). The structure will be approximately 55,000 square feet (5,000 square meters) of office and multi-use facility, sitting on a total of 5.0 acres (2.0 hectare). The five (5) acres will be subdivided into a 2.5 acre (1 hectare) parking lot facility, approximately 1 acre (0.4 hectare) for the radar facility itself, with the remaining acreage for fire lanes, security setbacks, etc. There will also be approximately seven poles used as radar targets. These structures will be 100ft (30.5 m) tall or less. Two, one hundred-foot poles will be mounted upon mobile trailers and will move along existing roadways. The other poles are 90 feet (27.4 m) tall, collapsible, with a four-foot (1.2 m) diameter cement base. Power and signal cabling will be routed to take advantage of existing upland right of ways. A small power/signal junction panel will be located at the base of each of the Tower locations. These towers will be used to inject low level Radio Frequency signals into the DD(X) Radar antennae via signal horns located near the top of the tower. Because of their proximity to the sensitive radars, the signal levels are extremely low level and do not represent a Radiation Hazard (power levels might be comparable to a cell phone power emission). A small power/signal junction panel will be located at the base of each of the Tower locations. The total footprint for each tower and associated power and signal panel is less than 400 square feet (37.2 square meters). All poles and their access for cables or maintenance will be on current rights-of-way or mowed lawns.

2.4 Alternatives to the Proposed Action

A series of meetings were held between NASA and Navy representatives to determine a set of alternative locations on Wallops Island which could support the proposed action (see Figure 2), as well as a no action alternative. A set of criteria was developed in order to determine a suitable location on Wallops Island. Due to planned expansion of launch activities on the southern half of the island, no site south of W-40 was considered acceptable by NASA. The criteria used in site location are as follows:

Radar operation requirements: This includes restrictions upon radiation arcs, presence of targets of opportunity, and interoperability opportunities.

Environmental requirements: This includes historical and current land use, the physical environment, and biological resources.

Safety requirements: A unique set of safety requirements are present at this location due to NASA's active launch range.

Conflicts with ongoing activities: This includes all facilities operated at Wallops by NASA and the Navy that may be affected.

Construction requirements: This includes the availability of utilities and related criteria.

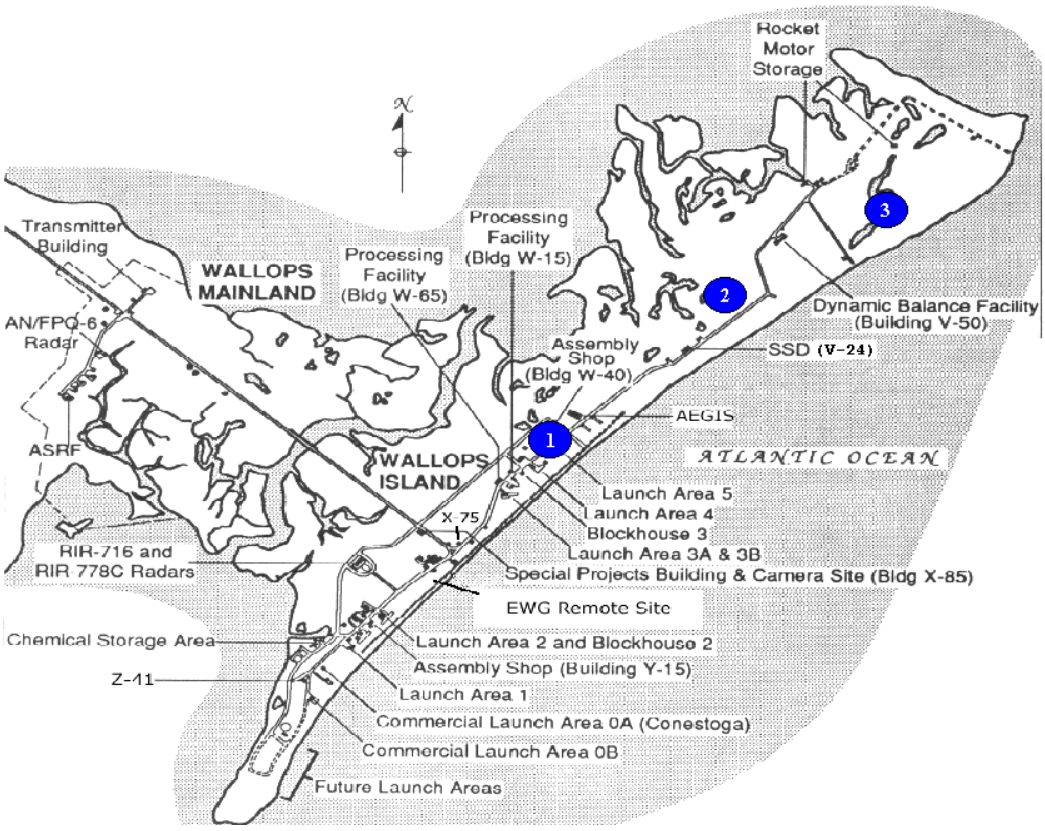

Figure 2: Potential Alternative Sites on Wallops Island, VA

2.4.1 Alternative 1: W-40 Site

Due to the presence of the launch range to the south, this was the southernmost location NASA considered acceptable. Although this site is located adjacent to a current launch pad, NASA's plan for Wallops Island includes moving this launch operation to the south. Some launch pads will remain nearby, which would require that the facility be evacuated for safety reasons during the infrequent launches (<12/year).

Preparations for launch would require close cooperation with radar emitters and launch activities. The proximity of the AEGIS facilities to this location may present occasional conflicts with other missions. These could easily be coordinated, and in fact present a valuable opportunity for interoperability testing. This makes it possible to avoid conflict with ongoing activities. Wetlands mitigation would be required for construction to occur on this site.

Radar operation requirements: Some interference due to the proximity of the AEGIS facility to the north. This area can be blocked out or used for interoperability studies.

Environmental requirements: Scrub/shrub wetland will be impacted. This habitat should not be difficult to recreate further north.

Safety requirements: The presence of the launch area to the south will sometimes require evacuation of the building.

Conflicts with ongoing activities: A launch pad and a meteorological tower will have to be moved.

Construction requirements: Utilities are available. No unusual challenges are expected.

There are only minor limitations due to environmental and safety requirements. The proximity of the AEGIS facilities to this location will require the blackout of a small portion of the emission arc. This is not a significant concern, and in fact presents a valuable opportunity for interoperability testing. There are no limitations on construction requirements and the radar operation requirements are best met through selection of this Site.

2.4.2 Alternative 2: North of V-24

This site located just north of V-24 and is between the other two alternative sites, as depicted on Figure 2. Most of the larger radars on the island radiate from north through east to south. Wallops Island trends from northeast to southwest. Sites up the island (northeast) are therefore more likely to impact existing radars than sites further down the island (southwest). In addition, the presence of Chincoteague Island, which is a resort community, and Assateague Island, which is an important nesting area for endangered birds to the north and east of Wallops, become limiting factors the further northeast on Wallops Island the proposed site is. This location is further up the island and further inland than Alternative 1, reducing visibility from the proposed

test/interoperability areas. An assessment of this alternative is presented as follows:

Radar operation requirements: Increased interference with Ship Self Defense Systems. Interoperability opportunities exist. Due to Assateague and Chincoteague Islands to the northeast, radar operations would be restricted. The physical presence reduces maneuverability of ships and planes cooperating with the proposed facility. For instance, planes can not fly over Assateague Island due to the presence of nesting threatened piping plovers. Nor would they be feasible in an area thriving with resorts, reducing the aesthetic equity in Chincoteague Island, in addition to compromising security.

Environmental requirements: The area is a mixture of mature maritime forest, which is relatively rare along the barrier islands, and tidal-influence wetlands. The mix would be difficult to recreate.

Safety requirements: No major concerns.

Conflicts with ongoing activities: No major concerns.

Construction requirements: Extensive filling would be required. All major utilities are available but not easily attainable. The utility lines would have to be extended to the site, requiring extensions of water and sewage lines, lift stations, phone and electric enhancement. Installation of electric service to this site would cost twice what it would at Alternative 1.

While there are only slight limitations on construction requirements and no negative safety requirements, nor conflicts with ongoing activities, there are limitations on radar operation and environmental requirements.

2.4.3 Alternative 3: North End

This site is the alternative location considered that is farthest north on the island. It is also due west of Assateague Island. The closest facilities to this alternative are utilized for rocket motor storage, as depicted on Figure 2. An assessment of this alternative site is as follows:

Radar operation requirements: Radiation arcs would be sharply restricted. In addition, targets of opportunity would be minimized. Planes can not fly over Assateague during the breeding season due to the presence of endangered birds which can abandon nests after fly-overs. Ships could work

with the radars only in the southern direction, due to the physical presence of Assateague due East of this site.

Environmental requirements: The presence of wild dunes on the site presents serious environmental concerns. Consultation could be required with several agencies to determine impacts and seek mitigation measures.

Safety requirements: No major concerns.

Conflicts with ongoing activities: There is a much smaller radar facility newly installed and operated by NSWC behind the site. This building would present a liability to that radar.

Construction requirements: There are no utilities in this portion of the island.

Numerous challenges are associated with this site. There are no utilities available in the area. Radiation arc over the ocean would be sharply restricted. Because the site is just inland from an extensive set of wild dunes, there are environmental concerns.

2.4.4 Alternative 4: No Action

The No Action Alternative assumes the continuation of all existing operations, systems, and other activities now in place at each of the locations considered and aboard ships. Under this alternative, no new activities affecting the physical environment would be conducted to predict the response of the DBR to its operating environment. This alternative would avoid all environmental impacts of construction and testing. Under this alternative, the proposed radars for the DD(X) could not be adequately tested before shipboard installation and use.

Under this alternative, this project would cause no change to the existing activities or environment at any of the sites. If new radars were to be developed, the support structure would not be built and the radars and communications systems could not be tested. The function of the radars could only be predicted theoretically and not functionally tested prior to deployment. Since this would pose an unacceptable risk to personnel, ships and equipment, and to the Navy mission overseas and at home, the No Action alternative is not viable.

2.4.5 Conclusion

There are only slight limitations on construction requirements and no unusual safety requirements or conflicts with ongoing activities at Alternative 2, there will be limitations on radar operation and environmental requirements.

Numerous challenges are associated with Alternative 3, as construction at this alternative site would require compromises, some extensive, to the radar testing/site selection criteria identified earlier.

While Alternative 4, the No Action alternative, causes no change to the existing activities or environment at any of the sites, not conducting initial testing in a controlled environment where individual safety, performance and interoperability parameters can be analyzed prior to the introduction to the fleet will introduce undue safety, schedule and performance risk on the radar platform and fleet sailors.

Due to the factors discussed above, Alternative 1 best meets all of the selection criteria, with only minor mitigated impacts to the environment and safety. This alternative provides the most flexibility regarding radar operation, building site placement, and infrastructure support. Selection of Alternative 1 allows for extensive and unobstructed interoperability.

2.5 Description of Alternatives

Wallops Island is a barrier island, located along the eastern shore of the Delmarva Peninsula in Accomack County, VA. This is a temperate climate zone, at 37º 56' North latitude and 75º 27' West longitude. Wallops Island is a narrow barrier island, roughly one (1) mile (0.34 km) wide at the proposed project site, and seven (7) miles (11 km) in length. The island has been used for compatible purposes for many years (see Section 3.4 below). A causeway and bridge provide access for vehicular traffic as well as for utilities.

For a more detailed description of the NASA Goddard Space Flight Center's Wallops Flight Facility, see Section 3.3 of the Environmental Resources Document (ERD), prepared by NASA in October 1999.

2.5.1 Description of Alternative 1

Figure 3 shows the general location of Alternative 1 (W-40). Figure 4 is an aerial of the site. Appendix C shows the proposed site plan and the proposed facility for this location.

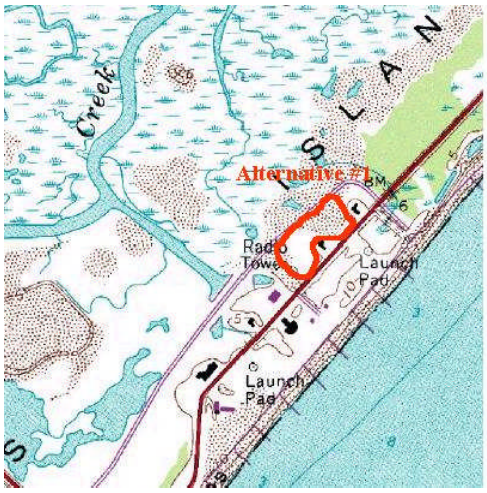

Figure 3: Alternative 1 Site Location Map

Figure 4: Alternative 1 Aerial View

Alternative 1 is located in the center part of the island. At this location, there are two roads about 600 feet (0.3 km) apart. The proposed site is between these two roads. They run parallel to each other and the shore, one on the bayside and one on the ocean side. The general location includes similar buildings currently used for rocket fabrication and storage, a water tower to the north, a 300-foot (91-meter) tower to the south, and a launch site across the road by the sea. The launch site and tower are slated for removal prior to use of the proposed facility.

2.5.2 Description of Alternative 2

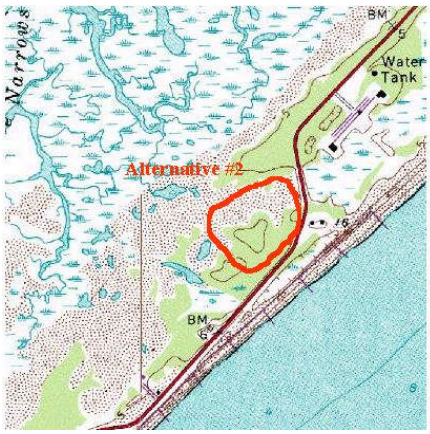

Figure 5: Alternative 2 Site

Figure 6: Alternative 2 Aerial View

Alternative 2 is located north of existing Navy facilities, as depicted in Figures 5 and 6. There is only one access road; the site is on the bayside of the road. The general site is currently unused. A mature maritime forest, interfingered with tidal-influence wetlands is currently at this location.

2.5.3 Description of Alternative 3

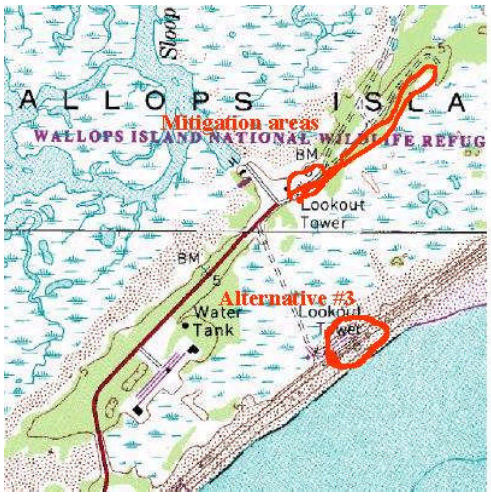

Figure 7: Alternative 3 Site Location Map

Figure 8: Alternative 3 Aerial View

The third site is on the north end of the island, as depicted in Figures 7 and 8. There is a road accessing the site. At present a helicopter pad exists adjacent to the site; it is little more than a cleared spot at the end of the road. Wild dunes abut the pad on the proposed site.

2.6 Description of the Surface Combat System Center (SCSC)

2.6.1 Mission of the SCSC

SCSC is a tenant of NASA's WFF, on Wallops Island, Virginia. A major goal of SCSC is to ensure that surface combatant ships are operationally ready to meet existing and potential threats throughout each ship’s operational life.

SCSC includes all of the infrastructure necessary for the normal services of a Navy command with permanently stationed personnel. These include family housing, bachelor quarter services, galley, administrative and financial services, facilities support, and supply services. Through NASA and the adjacent VACAPES OPAREA, extensive test support services are readily available.

2.6.2 Descriptions of SCSC Combat Systems

The SCSC provides surface ship combat system development, life-cycle engineering, test and evaluation, and training support to DoN acquisition programs, Fleet, and other customers as required. The facility is capable of emulating shipboard combat systems configurations, operating singly or in conjunction with each other (interoperability). A combat system consists of at least seven components, including supporting computers and peripherals, weapons systems with simulated weapons, computer programs that are specific to each system, internal and external voice and data communications, and simulators needed to create a tactically realistic environment.

The SCSC has the capability to conduct and coordinate Anti-Air Warfare, Anti-Submarine Warfare, and Anti-Surface Warfare test operations, functions, and training. Substituting simulators for specific weapons and underwater systems, the SCSC equipment suite is sufficient to completely replicate most shipboard combat systems configurations.

2.6.3 SCSC Facilities, Utilities, and Support Systems

SCSC is a tenant facility of the WFF, which is composed of three separate areas in close proximity to each other: 1) the Main Base, approximately 2,230 acres (903 ha) in size, is located to the north of State Highways 175 and 798; 2) the Mainland, approximately 100 acres (41 ha) in size, is located seven (7) miles (11 km) south on state highways 769 and 803; and 3) Wallops Island, approximately seven (7) miles (11 km) long by one (1) mile (1.6 km) wide (approximately 4,200 acres; 1700 ha), is located south of the Main Base and directly east of the Mainland. The SCSC Combat System facilities are located in the north-central portion of Wallops Island.

The SCSC on Wallops Island consists of two completely paved areas supporting a parking lot and buildings within the fenceline. The northern, Surface Ship Defense (SSD) facility contains only a single building, V-24. The southern, AEGIS facility contains three connected buildings: V-10 (AEGIS Cruiser Facility), V-20 (AEGIS Destroyer Facility), and V-21 (SPY 1D(V) Radar Facility). The entire complex is less than 1000 feet from the ocean.

SCSC also temporarily occupies NASA Building Z-41, located on the south side of Wallops Island, as a short-term test facility for the planned DD(X) AN/SPY-3 (XN-1) Multi-Function Radar, a part of the proposed Dual-Band Radar.

There is one access road to Wallops Island that includes a bridge over a coastal channel. NASA owns and maintains all the roads from the Island Gate, which is located on the adjacent mainland, to the Navy and NASA work sites located throughout the island, including the proposed DD(X) site. At present, roughly 300 Navy personnel (military, civilian, and contractor) and an additional 100 mostly NASA personnel use these roads to commute to work. Though the SCSC is operated around the clock, the majority of workers arrive around 7:30 a.m. and leave around 4:00 p.m. Shifts are staggered, so traffic delays are extremely rare, either on the island or on the main base.

Water is provided from groundwater wells located on the mainland. The water is piped to the island across the causeway. Sewage water is pumped from the island by force main to the treatment plant located on the main base, 8.7 miles (14 km) to the northwest.

Electricity is supplied by Conectiv Power. The electrical distribution system for Wallops Island was upgraded in 1989 to a design capacity of twelve million volt-amperes of electrical power. Currently Wallops Island is only using about a quarter of this capacity.

NASA picks up hazardous waste for transport as it is produced, and removes it to their EPA-licensed storage facility until pickup. Based upon research performed by NASA and described in Section 3.4.6., hazardous materials have never been used at any of the Alternative Sites.

Any programs or other customers proposing to use the combat systems components at SCSC must contact the SCSC prior to implementation for project coordination, planning and environmental analysis (OPNAVINST 5090.1B, CH-2, para. 2-3.1). SCSC environmental personnel would assist the customer in determining if the actions and environmental, safety, and health impacts associated with their proposed action are less than or equal to the actions and impacts evaluated in this EA using an SCSC form called “National Environmental Policy Act Documentation Sheet" (Appendix B).

Consistency with the actions and impacts evaluated in this EA can be documented by SCSC as a Categorical Exclusion or by the action proponent in a Memorandum for Record (MFR) pursuant to Department of the Navy Environmental Policy Memorandum 99-01; Requirements for Environmental Considerations in Test Site Selection (11 May 99, para. (b)). No further analysis and documentation under NEPA would be required. If the actions or impacts are not consistent with those evaluated in this EA,

then the action proponent, coordinating with SCSC, is responsible for ensuring NEPA compliance prior to any proposed activities taking place.

2.7 Description of the NASA Goddard Space Flight Center, Wallops Flight Facility

This information is summarized from the NASA Environmental Resources Document (ERD) for the NASA Goddard Space Flight Center, Wallops Island Facility, Wallops Island, VA, dated October 1999.

2.7.1 Mission of the Goddard Space Flight Center, Wallops Flight Facility

The mission of the Goddard Space Flight Center, Wallops Flight Facility (referred to as WFF in this EA) is to:

"*Enable scientific research through the development and deployment of low-cost, highly capable suborbital and orbital research/payload carriers and science platform mission services.*

Enable aerospace technology and facilitate commercial use of space through advanced technology development, testing, operational support, and facilitation of the commercial launch activity at WFF.

Enable education, outreach and innovative partnerships by providing science and technology educational opportunities, and pursuing innovative partnerships with academia, other government agencies, and industry."

Since 1959, WFF has been instrumental in the development of United States' efforts to use rockets to conduct high speed aeronautical research and ballistic missile nose cone research, rocket development research for the Mercury program, and research and launches of the Scout satellite launch vehicle. Its missions have since expanded to include a variety of research and development and test and evaluation activities for DoD and other national and international customers.

2.7.2 WFF Facilities and Utilities

The Wallops Test Range consists of a launch range, an aeronautical research airport, and associated tracking, data acquisition, and control instrumentation systems. WFF facilities include offices, laboratories, maintenance and service facilities, a NASA-owned and operated airport, air traffic control facilities, and hangars and aircraft maintenance and ground support buildings. Additionally, the

installation has water and sewage treatment plants, storage magazines, fuel storage facilities, US Navy and Coast Guard housing, and other miscellaneous structures.

Research and development laboratories and facilities include a research airport; Payload Integration and Environmental Testing laboratories with launch facilities; a machine shop for fabricating rocket payloads and launch vehicle components; the NASA Balloon Program laboratory; wind-wave current laboratory; and Calibration and Chemical Laboratories.

Conectiv Power Delivery of Virginia supplies electric power. Potable water for Wallops Island is supplied by two wells and is piped to the island. The buildings on Wallops Island are served by a combination of gravity and forced sewer mains that feed to a sewage treatment facility on Main Base. NASA owns a paved road, a bridge, and a causeway, which connect the Mainland and Wallops Island. Fire protection is provided to Wallops Island by Fire Station 2 with water from a 200,000-gallon ground-level water tank.

2.7.3 WFF Tenant Activities

In addition to the tenant activities associated with the SCSC, as described in section 3.2, WFF hosts a detachment of the Naval Air Warfare Command (NAWC), Virginia Spaceflight Center/ Mid-Atlantic Regional Spaceport (VSC/MARS), and the National Oceanic and Atmospheric Administration (NOAA) Environmental Satellite Data Information Service Command and Data Acquisition activity. The NAWC detachment provides Navy drone and missile target build up facilities and launch services. The Virginia Commercial Space Flight Authority is responsible for the development and operation of the VSC/MARS, a FAA licensed commercial spaceport at Wallops Island. The VSC/MARS provides facilities and services for commercial launches of payloads into space. Activities include launch vehicle and payload preparation, integration and testing, prelaunch operations, launch range integration, and launch and postlaunch operations. One state employee and five contractors are employed at this center. NOAA provides unlimited 24-hour flow of weather satellite-derived sensor data to the U.S. and the world.

3 EXISTING ENVIRONMENT

3.1 Land Use

3.1.1 Historical and Current Land Use

Wallops Island has been used by man throughout history. Like many barrier islands, grazing, hunting, and fishing were common in the distant past and continued until recently. Unlike most other islands, Wallops has been used by military or NASA engineers for testing and development through most of its recent history. This unusual mix of wild lands and high technology has been vital to the success of the Surface Combat Systems Center. The technology provides the support, while the wild lands provide insulation from conflicts with other development in the area.

Wallops Island was located within the lands occupied by the coastal Algonkians of the Chincoteague or Kickotank tribes. Like other barrier islands, Wallops Island was probably used by the Algonkians for fishing and hunting but not as a permanent residence. It was granted by Crown Patent to John Wallop in 1672; he used the land for grazing. Occupation developed gradually; by 1800, roughly six (6) families with 30 people lived on or near the island.

Military presence on the island began during the Revolutionary War. In August of 1779, a small fort on the Island, eight (8) defenders, a sloop and a schooner were captured by a British force of 30.

In 1883, Wallops Beach Station of the U.S. Life Saving Service was established on northern Wallops Island. The rest of the island became a hunting and fishing preserve for a Pennsylvania sporting club.

The National Advisory Committee for Aeronautics (NACA, predecessor to NASA) initiated a site on the southern portion of Wallops Island in 1945, and purchased the entire island in 1949. In the spring of 1947, the Navy leased the northern section of the island for ordnance testing. In 1959, Navy use of the Island ceased and the Navy's main-base facility near Wallops was turned over to NASA. NASA continued to expand use of the Island, constructing the causeway in 1960 and building beach stabilization dunes in 1962. Since the first rocket was launched in 1945, roughly 13,000 rockets have been launched to date.

Taking advantage of the marine environment and the technological support structure available at Wallops Island,

the Navy broke ground on Wallops Island in 1982 for the AEGIS Combat Systems Center facility. That building has since expanded into a full base. Support facilities are located on the Main Base, 5.5 miles (9 km) north of the first building. A second engineering support building adjacent to and connected with the first was completed in 1990, and a third, smaller support for the SPY 1D(V) radar was completed in 2003. A Ship Self Defense (SSD) facility with similar function was completed 3/4 mile (1.1 km) north of the first facility in 1997.

With regard to existing radar facilities at Wallops Island, NASA performs frequency coordination for all of the island facilities, both among the users of Wallops Island and with external users and agencies. NASA also manages a program to assess spectrum use and to identify potential spectrum sharing problems within specific frequency bands allocated to the Federal Government. The objectives of this program include:

(1) The review and documentation of the characteristics and deployment of existing frequency assignments and proposed systems in specific frequency bands.

(2) The identification of band sharing problems which may impact on the efficient use of the spectrum in the Wallops/Norfolk area.

(3) The evaluation of any identified electromagnetic compatibility problems.

(4) The identification of alternative spectrum management approaches to resolve these problems.

The sources of data used in completing these studies include the Government Master File, system data, data collected during the spectrum measurement and survey, as well as direct contact with other user agencies - NASA WFF, Naval Surface Warfare Center (NSWC), Naval Electromagnetic Spectrum Center (NAVEMSCEN), Joint Frequency Management Office, Atlantic Office (JFMO LANT), and the Federal Aviation Administration (FAA).

Radar is an electronic device that transmits Radio Frequency (RF) electromagnetic radiation and detects the nature of the echo signal off of objects in order to provide information on the target (e.g., range, bearing, speed, etc. While most of the materials utilized in the construction and operation of a radar facility are not hazardous, the development of systems with high-power RF transmitters and high-gain antennas has increased the possibility of biological injury to personnel working in the vicinity of these RF systems. For the purposes

of potential Radiation Hazards (RADHAZ), including Hazards of Electromagnetic Radiation to Personnel (HERP), radar can be considered to be a high-powered directive radio frequency transmitter. Current radar systems utilize that portion of the electromagnetic spectrum within the approximate frequencies of 100 through 100,000 MHz. The term “microwave” is generally applied somewhat arbitrarily to frequencies within this band. The radiation from RF antennas differs in frequency spectrum from the ionizing radiation region of X-rays and gamma rays and is consequently classified as non-ionizing radiation.

In the most elementary form, the RF signal is transmitted in a particular type of waveform (a pulsed sine wave for example) from a transmitting antenna; a portion of the signal is intercepted by the reflecting object (target) and re-radiated. The receiving antenna (usually the same as the transmitting antenna) collects the returned energy and delivers it to a receiver for processing to detect the presence of a target. In order to cover a search area, the beam is usually scanned, or swept across the area of sky to be searched. The important considerations for the determination of potential RADHAZ are that the RF radiation from a radar usually consists of a “beam” of a particular waveform (usually pulsed) scanned through a volume of space to be searched for targets.

The Department of Defense (DoD) establishes permissible exposure limits (PEL) for personnel based on international standards. The DoD RF Safety Standard (DoD Instruction 6055.11) which is in agreement with the general industry consensus standard (IEEE C95.1-1999) assumes worst case conditions in developing the frequency dependent PELs used to determine potential HERP limits. PELs are based on thermal effects – the actual heating of tissue due to the absorption of RF energy. The biological effects of RF exposure have been determined to be a function of the specific absorption rate (SAR). The threshold for adverse biological effects is recognized to be 1.8 Watts per pound (W/lb) (4 Watts per kilogram (W/kg)). With a safety factor of 10 added, the accepted threshold level is 0.18 W/lb (0.4 W/kg) for whole body exposure. The standard is a frequency-dependent limit and is usually based on the average power of an RF field over either a 0.1 hour (six-minute) or 0.5 hour (30-minute) time interval, depending upon whether the area is considered to be a controlled or uncontrolled area.

Uncontrolled environments are locations in which exposure may be incurred by individuals who have no knowledge or control of exposure including residences and most places where the

infirm, the aged, or children are likely to be. It also includes work environments where employees are not specifically involved in the operation or use of equipment that does or may radiate significant electromagnetic energy and where exposure levels are never expected to exceed those shown in the standards for uncontrolled exposure. Uncontrolled areas may involve the exposure of the general public as well as occupational personnel, e.g., in passing through areas in which there is a transmitting radar.

Controlled environments are locations in which exposure may be incurred by persons who are aware of the potential for exposure as a concomitant of employment, by other cognizant persons, or as the incidental result of transient passage through areas where analysis shows exposure levels may be above those shown in the standard for uncontrolled environments but below those shown for controlled environments. The Space and Naval Warfare Systems Center, responsible for determining potential HERP for Navy shore sites, has identified the Wallops Island environment to be a Controlled Environment. Only employees or escorted personnel are granted access.

The known detrimental effects of over-exposure to RF radiation are determined by the average power of the absorbed radiation, are thermal in nature, and are associated with an over-all body temperature rise or temperature rise in specific organs of the body.

The depth of penetration and coincident heating effects of energy on the human body are dependent on frequency, the region of transition being between one (1) and three (3) GHz. Below 1 GHz, the RF energy penetrates to the deep body tissues; above 3 GHz, the heating effect occurs closer to the surface. As an example, the two microwave oven frequencies used are 915 Mhz, which produces a deeper heating effect on roasts and 2450 Mhz which is effective for surface cooking (browning).

In summary, the adverse effect of RF radiation on live tissue is a result of the heat produced by absorption of RF energy impinging on the body. If the organism cannot dissipate this heat energy as fast as it is produced, the internal temperature of the body will rise (as in a fever). This may result in damage to the tissue and, if the rise is sufficiently high, in death.

A Hazards of Electromagnetic Radiation to Personnel (HERP) survey of all existing Navy emitters at Wallops Island was conducted in the summer of 2003 by the Space and Naval Warfare

Systems Center (SPAWARSYSCEN) Charleston, SC. Actual RF measurements were used to determine the potential HERP restrictions in accordance with the established Navy and Industry standards previously discussed. This survey is updated as any new emitters are added but with a periodicity not to exceed five years.

The operating characteristics of phased-array radars (including SPY-1, MFR & VSR) are generally the same, particularly when considering possible HERP at Wallops Island. Operation of the AEGIS AN/SPY radar systems with high power is included under “normal operating condition”.

Any of the AN/SPY radars can make repeated transmissions in the same direction. This is an unusual, controlled condition called Programmable Energy (PE) transmission. This can result in significant amounts of the radar system’s available energy being transmitted in one direction. Where more than one SPY radar array arc covers the same area, the radiated energy may add together, causing the Safe Separation Distance (distance to where the potential hazard to humans ceases) to be a greater distance than that for each radar operating separately. This absolute worst case condition is used to determine the maximum potential HERP hazard distance. No HERP hazard conditions were found during the survey at any of the locations at which measurements were collected. The calculated HERP regions exist only above ground level, at or above the elevations of the radar antennas at existing SCSC facilities (greater than 60 feet (18.3 m) above the ground/water surface). The roof areas of Buildings V-10 and V-20 below the SPY-1 radars are not normally HERP areas; however, they are within the near-field region of the antennas, which is characterized by unfocused radiated energy patterns which are difficult to predict - these areas are therefore restricted from access during AN/SPY-1 radar operations through the use of interlocks. Measurements confirmed that calculated worst case levels from the SPY-1 and SPS-49 radars at ground level were well below the HERP safety limits for even uncontrolled areas.

An Electromagnetic Environmental Effects (E^3) review of the AN/SPY-3 (XN-1) MFR was completed in August 2002. A primary purpose of the review was to identify potential radiation hazards prior to system installation. That report is entitled "Space and Naval Warfare Systems Center, Charleston, SC Electromagnetic Environmental Effects (E^3) Review of the Request for Site Approval for Installation of a Multi-Function Phased-Array Radar AN/SPY-3(XN-1) at Surface Combat Systems Center (SCSC), Wallops Island, VA Final Report, E^3 Task No

E02007, August 2002". No radiation hazards to personnel were identified below 60 feet elevation. A survey of actual RF measurements to verify the findings of the above named report will be made for this proposed radar as soon as activation is completed and full power radiation is possible

3.1.1.1 Alternative 1
The site itself has not been used historically. There is a NASA building (W-40) adjacent to the site which has been in place since 1957. It was then and is still used for the assembly of multi-stage research vehicles. Additionally, a water tower is located approximately 100 yards north of the proposed building location for this alternative.

3.1.1.2 Alternative 2
No known use of this area has ever occurred. The presence of a mature maritime forest tends to confirm that the area has not known any use by man. A few openings were made ten years or more ago for fire breaks or for geological sampling that have since been vegetated with *Phragmites australis* (common reed), an invasive species. A water tower is located a little over ½-mile northeast of this alternative.

3.1.1.3 Alternative 3
A nearby clearing was made in the mid-1980's to allow helicopters to land on Wallops, but it has been rarely used. The more common use of this area is on weekends when employees park their cars here and walk to the beach. A water tower and a lookout tower are located over ½-mile to the west and ½-mile to the north, respectively, of this alternative.

3.1.2 Areas of Unique Significance

Assateague Island National Seashore (under the jurisdiction of the National Park Service), and Chincoteague National Wildlife Refuge, (under the jurisdiction of the US Fish and Wildlife Service), located adjacent to Wallops Island to the northeast, are the main tourist destinations in the area. Chincoteague Island (an incorporated town) is the site of the annual Chincoteague Pony Penning every July. The chain of nearly wild barrier islands extends from the Virginia line south to the tip of the Delmarva Peninsula. Assawoman Island, the next island southwest of Wallops in this chain, is a wildlife refuge owned by the US Fish and Wildlife Service. The Nature Conservancy has acquired most of the twelve barrier islands lying to the southwest of Assawoman Island. This group of islands, called the Virginia Coast Reserve, consists of about 35,000 acres (14,200 ha) and encompasses most of the coastal area for 60 miles (100 km).

3.1.2.1 Alternatives 1-3
Alternative 3 is closest to Chincoteague (approximately 3 miles) and Assateague Islands (approximately 2.5 miles) and farthest from Assawoman Island (approximately 5 miles). Alternative 2 is approximately three miles from Assateague and three miles from Assawoman. Alternative 1 is the closest to Assawoman Island (approximately 3 miles) and farthest from Chincoteague and Assateague Islands (approximately 4 miles.

3.1.3 Cultural Resources

There are no known areas near any of the proposed project sites which are significant to any Native American groups according to NASA's "Cultural Resources Assessment, NASA Wallops Flight Facility, Accomack County, Virginia" dated November, 2003.

On the Eastern Shore of the Delmarva Peninsula, more than two dozen buildings and structures have been placed on the National Register of Historic Places and listed as Virginia Historic Landmarks. These resources often attract visitors to the area. Although not officially recognized as a historic landmark, WFF has been a significant contributor to area history due to its contributions in rocketry, aircraft design, and manned space flights over the years. An architectural and archaeological resources study was performed for WFF (*Cultural Resources Assessment of Wallops Flight Facility, Accomack County, Virginia*, November 2003).

As noted in the Federal Coastal Consistency Determination Response Letter dated December 16, 2003 and the Department of Historic Resources (DHR) Memorandum of November 21, 2003 (provided in Appendix D), review of Alternative 1 by the Department of Historic Resources found that the project has the potential to affect architectural and/or archaeological resources listed in or eligible for the National Register of Historic Places. Therefore the Navy is legally required under Section 106 of the National Historic Preservation Act to consult with Department of Historic Resources. A letter from DHR on February 9, 2004 (see Appendix D) stated "We have determined that no known archaeological resources will be affected by the proposed project." Although an archeological survey of the 1.1-acre project area (field north of Coast Guard Station, not located at the Alternative 1 Site) proposed for use as a wetland mitigation site resulted in the identification of one previously unrecorded archaeological site (44AC459), the VA Department of Historic Resources determined it not to be a significant historic resource (see

Appendix D, May 25, 2004). Use of Alternatives 2 or 3 would require further consultation.

3.1.3.1 Alternative 1
There are no known cultural resources per consultation with the Department of Historic Resources.

3.1.3.2 Alternative 2
NASA's Cultural Resources Assessment did show this area as having a moderate sensitivity for historic resources and a high sensitivity for prehistoric resources. An archaeological survey, followed by consultation with the Department of Historic Resources, would be required.

3.1.3.3 Alternative 3
Based on NASA's "Cultural Resources Assessment", there are not likely to be any cultural resources, but consultation with the Department of Historic Resources would be required.

3.1.4 Hazardous Material Contamination

NASA has surveyed Wallops Island for possible hazardous materials contamination. Although there are several sites which have been through remediation or are currently undergoing remediation, none of these sites impact any of the proposed Alternatives or mitigation areas.

3.1.4.1 Alternatives 1-3
Based upon surveys performed by NASA, there is no known contamination at any of the proposed Alternative Sites.

3.2 Physical Environment

3.2.1 Physiography and Soils

Wallops Island is located in the Atlantic Coastal Plain Physiographic Province, which is an emergent section of the continental shelf. It is a barrier island, part of a chain of low, sandy islands bordering the Atlantic coast. As a barrier island, Wallops Island is composed of unconsolidated sands, periodically subjected to the forces of barrier island movement. The water table can be as shallow as 12 inches (30 cm).

3.2.1.1 Alternative 1
Soils at this location are saturated but not normally under standing water. Topography is flat.

3.2.1.2 Alternative 2
Soils vary. This is an old dune ridge complex. On the ridges, mature forest grows in sandy soil at elevations up to

five feet above the surrounding wetlands. In the swales, soils tend to be more organic, and are normally saturated. These dunes and swales alternate on an average of every 20 to 50 feet.

3.2.1.3 Alternative 3
This site is an active dune environment. Both the dune tops and the swales are very sandy. Topography is varied, with the dunes rising as much as 10 feet above the intermediate swales.

3.2.2 Floodplains

Virtually the entire island is within the 100-year floodplain and is subject to overwash during storms. This is expected and no significant flood damage has been recorded to Navy structures on the island, due in part to site design. The first floor of the proposed building would be built at or above the base flood elevation of nine (9) feet (2.7 m) above mean sea level, in compliance with the National Flood Insurance Program.

3.2.2.1 Alternative 1
During storms, wave action from the sea is limited by a rock seawall. Water can also wash in from the bay, often with destructive effects. This flow is likely to be minimal until the water overflows the roadway behind the site. At that point, a sheet of water will crest over the road, flowing toward the sea. In many hurricanes, this flow is highly destructive. Any concentration of this flow would increase its speed and hence destructive capacity.

3.2.2.2 Alternative 2
Stormwater from the sea would be impeded by a set of dunes and a stretch of scrub-shrub wetland. Water from the bay would be likely to inundate the site, since there is no protection from the saltmarsh behind the site.

3.2.2.3 Alternative 3
Stormwater from the sea would be the greatest threat despite a stretch of dunes in front of the site. Water from the bay would not be a likely threat due to the presence of a road and extensive wetlands to absorb floodwaters behind the site.

3.2.3 Water Quality

Drinking water comes from deep wells located on the mainland, roughly three miles from the proposed site. The water system is owned and operated by NASA. This is a sole-source aquifer, but supplies are ample and quality is high

Groundwater on the island has been tested by NASA to determine contamination at specific sites. A select number of sites on the island were found to be contaminated and are currently undergoing remediation. Contamination at these sites has been proven to be localized and does not impact any of the Alternative locations. There are no industrial discharges on the island.

Sewage water is discharged via a force main to a treatment plant located on the Main Base. Discharges are into Mosquito Creek, roughly nine (9) miles (14.5 km) from Alternative 1. Both the plant and the force main are owned and operated by NASA.

On the ocean side, storm floods could impact all of the Alternatives, potentially washing construction silt into the Atlantic.

No designated wild or scenic river is close enough to the proposed site to be impacted.

3.2.3.1 Alternative 1
This site is surrounded by higher elevations except on the west, where a ditch drains the site into Cat Creek and hence to Bogues Bay.

3.2.3.2 Alternative 2
There is a large saltmeadow marsh to the west of this site. Waters would drain through the marsh to Bogues Bay.

3.2.3.3 Alternative 3
This site has a large marsh to the west, which is giving way to solid *Phragmites australis*. Waters would normally drain toward the east and into the Atlantic Ocean.

3.2.4 Air Quality

Wallops Island is located within the Eastern Shore portion of the Tidewater Region of the State of Virginia air quality districts. This region does not exceed standards in any of the criteria air pollutants listed in the air quality ambient standards for the State of Virginia and the United States. Since Wallops Island is located in an Attainment Area for all air quality standards, a General Conformity Analysis under the Clean Air Act is not required.

3.2.4.1 Alternatives 1-3
There would be no significant impact regardless of the alternative chosen.

3.2.5 Noise

Except for occasional construction or launch activities, Wallops Island has no major noise sources: decibel levels average 20 to 50, depending on the weather. The nearest privately-owned lands are 0.6 miles (1 km) away, but these are agricultural lands.

3.2.5.1 Alternative 1

The closest potential sensitive receptor, a small housing development on the mainland, is over 2 miles away from this potential Alternative. Normal decibel levels depend on the weather.

3.2.5.2 Alternative 2

The closest potential sensitive receptor, the small housing development, is over 2.3 miles away from this potential Alternative.

3.2.5.3 Alternative 3

The closest potential sensitive receptor, the same small housing development, is over 2.7 miles away from this potential Alternative.

3.2.6 Wastes

NASA manages hazardous waste and accidental releases. Waste produced by the Navy is maintained in satellite accumulation areas until collected by NASA. There is a satellite accumulation area in each building occupied by the Navy, and it is usually located at the HazMin Center.

Spills are reported via 911, which alerts the base emergency responders. A hazardous material response team is part of that system. NASA holds the EPA registration for hazardous waste management. The proposed facility would be included in this system.

Sanitary wastes are sent by force main to NASA's treatment facility on the Main Base, which discharges to Little Mosquito Creek. The proposed facility would be connected to this system.

Solid wastes are managed by contract jointly through NASA and the Navy. In addition, both agencies are working toward a recycling program aimed to comply with the mutual goal of recycling 40% of the waste stream. The proposed facility would be included in this program.

3.2.6.1 Alternatives 1-3
At each alternative site, the Site Accumulation area for waste would be within the building and in an area managed by hazardous materials personnel. None of the sites are currently contaminated.

3.2.7 Coastal Zone

The open ocean lies less than 0.2 miles (0.33 km) from the proposed sites. A rock seawall has been placed along the shoreline in the center of the island to retard damage from storm events. Due to the presence of the seawall, there are no dunes in the central portion of Wallops Island.

The ocean east of Wallops Island is shallow: 33 feet (10 m) deep at 2.8 miles (4.5 km) offshore. The combination of fertile bays inside the islands and the offshore Gulf Stream with its warm currents produces abundant marine life.

The island has been used for many years for projects and programs similar in nature and impact to the proposed action. No change in the current use of the coastal zone is proposed.

3.2.7.1 Alternative 1
This is in an area already relatively developed for similar uses. W-40, where multi-stage research vehicles are assembled for launch, is adjacent to the site. There are no dunes here; there is a rock seawall between the site and the sea.

3.2.7.2 Alternative 2
The Ship Self Defense building (V-24), a current Navy structure, is used for much the same purpose. It is located roughly half a mile south of Site 2. To the north about the same distance is NASA's Spin Balance Lab, where fueled rocket motors are tested for stability. The seawall ends at V-24, so only dunes and scrub-shrub wetland lie between this site and the sea.

3.2.7.3 Alternative 3
No structures are near this site except a small intermittent camera stand. Dunes stretch from this site to the ocean, with bayberry stands in the swales between the older dunes. This is an area of rapid accretion, so the dunes continue to build and the beach continues to grow toward the east.

3.2.8 Wetlands

Wetlands are the dominant ecological system on Wallops Island and in Accomack County. Wetlands vary from scrub-shrub habitat where the ground is normally dry to the saltmarsh

where the ground is rarely dry. Wetland habitats are determined by elevations and position relative to the spine of the island. On Wallops, the variety and abundance of the wetland habitats is limited only by the plants' tolerance of salt. Salt is delivered both in overwash events and in the wind, where salt loads are picked up from sea surface turbulence under windy conditions. The US Army Corps of Engineers cooperated closely with the Navy in defining wetlands for each potential Alternative.

3.2.8.1 Alternative 1
This site is comprised of 2.9 acres of wetlands and 2.1 acres of uplands. The wetlands are scrub-shrub, mostly *Morella cerifera* (wax myrtle). The wetlands are contiguous with each other.

3.2.8.2 Alternative 2
This site is also roughly half wetlands, but they are interfingered throughout the upland sections. The wetlands are damp pockets in the swales of old dunes, often cut off from direct drainage to the marsh. If this Alternative is chosen, the exact dimensions of the wetlands present would have to be determined in consultation with the United States Army Corps of Engineers.

3.2.8.3 Alternative 3
There are only minor pockets of wetlands on this site. They consist of small pockets in the swales of active dunes. Delineation by the United States Army Corps of Engineers would be required if this site were chosen.

3.3 Biological Resources

3.3.1 Plant Communities

The predominant community on Wallops Island is the dune/swale community. This community has been disturbed by a variety of events in the past, both man-made and natural (e.g. clearing, fire, overwash). In general, areas disturbed within the past ten years are dominated by Common Reed (*Phragmites australis*).

There is currently an ongoing multi-agency program in the vicinity directed at control of *Phragmites australis*. Should the plant invade the proposed project site, it would be included in the current control project.

Older communities are a mixture of bayberry or myrtle (*Morella pennsylvanica* or *M. cerifera*), groundsel (*Baccharis halimifolia*), wild cherries (*Prunus serotina*), and a variety of herbs.

The spine of the island contains a road area, bordered by mowed lawns and connected to the various facilities used by NASA and the Navy. The northern half of the island includes a maritime forest along the spine, generally between the road and the bay. This forest is dominated by loblolly pine (*Pinus taeda*), but includes red maple (*Acer rubrum*), wild cherries (*Prunus serotina*), and black willow (*Salix nigra*).

On the ocean side, the road and lawn area is bordered by large rocks placed to stabilize the shore. The rocks are washed by the sea except at the lowest tides. To the north, the ocean is bordered by high-quality, wild dunes along an accreting shoreline.

On the bay side there is a saltmarsh gradually declining in elevation to Bogues Bay. Upper elevations are dominated by groundsel (*Baccharis halimifolia*). At dropping elevations, communities are dominated by salt-meadow hay (*Spartina patens)*, with a band of saltwater cord grass (*Spartina alterniflora)* along the edge of the water. Elevation changes necessary to alter the dominant plant community are usually measured in feet (decimeters, 1/10 meter).

3.3.1.1 Alternative 1

This site is predominantly a scrub-shrub habitat, with the exception of a mowed field on the southern half. The scrub-shrub consists mostly of *Morella cerifera* (wax myrtle) and *Baccharis halimifolia* (groundsel bush), heavily invaded by invasive *Phragmites australis* (common reed). *Phragmites australis* is an exceptionally invasive plant and represents over 37% of the cover on this site. *Lonicera japonica* (honeysuckle), also an invasive, averages 36% of the cover.

3.3.1.2 Alternative 2

This site is dominated by *Pinus taeda* (loblolly pine) with an open understory. Firebreaks cut in 1992 have grown up with *Phragmites australis*. The mature trees prevent invasion otherwise.

3.3.1.3 Alternative 3

Due to the proximity of the ocean, the dominant species here is *Morella pensylvanica* (bayberry). Disturbance around the edges of the site have allowed minimal invasion by *Phragmites australis*.

3.3.2 Wildlife Species and Habitat

Wildlife on Wallops Island is abundant. A freshwater pond (mitigation for the Navy’s first building on the island), located between Alternative Sites 1 and 2, just over 1 mile

south of Alternative 2 supports a variety of aquatic species, as well as vertebrates such as Canada geese, least terns, egrets, otters, and ducks. Deer, rabbits, raccoons, foxes, mice, and other mammals are abundant. Freshwater turtles and snakes are regularly seen on the island roads, seeking nesting areas or simply absorbing the warmth of the macadam. In the nearby marshes, a variety of water and perching birds build their nests. Shorebirds are found all along the beach. Offshore, a variety of dolphins, whales, and marine turtles are common.

In the summer, birds are abundant in the area, except near the Navy buildings due to the lack of habitat from the surrounding parking lots. The only significant exception is the swallows, which are attracted to the buildings intentionally by the installation of bird boxes along the fences. Since these birds eat mosquitoes, which are notorious on Wallops, their presence is welcomed and encouraged. The radiation hazard zone overhead does not appear to affect these birds. Their population has gone from near zero before the Navy arrived in 1984 to several hundred today. Thus any negative effect the radiation might have is insignificant compared to the positive effect of breeding box availability.
Other birds of many kinds do breed in the area. As noted above, the lack of habitat on the building and parking lot prevents most of these birds from approaching the existing buildings; the same effect is expected for the DD(X) facility. There are a few species which pass overhead. Vultures circle over the island, sometimes passing above Navy facilities. Gulls pass from the ocean to the bay, again sometimes passing Navy facilities. The fact that these birds are in motion, and the radar beams are also in motion, means that there is almost no potential for lengthy radiation of an individual. There have been occasions when gulls in flocks were observed flying across the island, right toward the emitters of the SPY-1 A and B radars existing today. In every case observed, the birds flew on past the radars without exhibiting any behavioral evidence of discomfort. They altered course only to avoid the physical presence of the mast bearing the radars. The radars were known to be emitting at the time of the observation.

Within the saltmarsh, high tides bring small fish (e.g. *Fundulus, Gambusia*), especially to the larger ponds. Small ponds, or extensions of the large ponds which are inaccessible to fish, contain an abundance of invertebrate aquatic life, especially *Ochlerotatus sollicitans* (saltwater mosquito) and *Ochlerotatus taeniorhynchus* (black saltwater mosquito). With

a further slight drop in elevation, open tidal flats support various species of clams and oysters. Bogues Bay itself averages less than 2 feet (0.5 m) deep. The water is exchanged to the north through Chincoteague Inlet. Because the inlet is not directly connected with Bogues Bay, the water varies in salinity but tends to be less saline than seawater. Like most of the shallow, brackish bays behind the barrier islands, Bogues Bay serves as a nursery for many economically and ecologically important species.

Navy buildings themselves host a variety of birds. Bird boxes have been installed along the fencelines to provide mosquito control. Usually occupied by tree swallows, these houses are also used by bluebirds and wrens, especially during the late summer. Barn swallows also nest in the upper structures of the facilities, and purple martins use the martin houses placed just outside the fenceline.

During the migration season, large flocks of birds following the coastal route of the Atlantic Flyway pass adjacent to and over Wallops Island. In the spring, most migrants pass further inland or fly at sea or at higher elevation. Although shorebirds are observed in the area on their spring migrations, they fly at higher elevations or low along the water's edge. According to a Phase I Avian Risk Assessment for the James Madison University-NASA Wind Power Project, Wallops Island, Accomack County, Virginia, September 2004, most migrants fly at night, and between 300 and 2500 feet. Thus large numbers of birds in transit are not observed in the spring.

A study was conducted in cooperation with the Fish and Wildlife Service for three years during the fall migration season. Species which were observed migrating close to Wallops Island include: kestrel, sharp-shin, osprey, peregrine, harrier, cooper, rough-leg, bald eagle.

In the fall, tree swallows can literally darken the skies. Shorebirds, seabirds, and raptors pass down the chain of barrier islands by hundreds and thousands. Dolphins can be seen moving in family groups just offshore. Monarch butterflies pass by singly but constantly. In winter, the island plays host to a variety of shorebirds, ducks, and geese. Though population levels are as dynamic as the island environment, wildlife is always abundant and varied.

3.3.2.1 Alternative 1

The predominant species here are the passerines. Myrtle warblers are abundant, especially in winter. Grackles hunt among the bushes, and yellow-throats nest in the branches.

3.3.2.2 Alternative 2
Birds here tend more to be forest species. Wrens are more common, as are flycatchers. Dragonflies and butterflies are also more common on this site.

3.3.2.3 Alternative 3
The sandy dune environment defines the species on this site. Ghost crabs are common. Sparrows nest in the grasses, and grackles hunt through the branches of the bushes.

3.3.3 Federally Protected Species

The Navy (SCSC) ecologist has spent nearly 20 years on the island, doing surveys and monitoring the area. Based upon this research, no threatened or endangered species are known to occur on Wallops Island other than those discussed as follows.

The listed species most likely to occur on Wallops Island are the bald eagle (*Haliaetus leucocephalus*) (Federal- and state-listed, threatened) and piping plover (*Charadrius melodus*) (Federal- and state-listed, threatened). While both have been documented infrequently on Wallops Island, neither is known to breed or forage close enough to be impacted by the project. The piping plover breeds and forages mostly south of Wallops Island, although some use is made of the far northern end as well. The bald eagle is a random visitor for foraging, especially if there is a carcass available for scavenging.

Three scrapes created by the threatened loggerhead sea turtle (*Carreta carreta*) have been historically recorded on Wallops Island, but none produced eggs. Wallops Island lies within the range of four other federally protected species of sea turtles, but to date none have been observed on Wallops Island.

Several species of porpoises and whales also live in the open ocean east of the barrier islands. There is an occasional stranding, which is normally reported to the Virginia Marine Stranding Network.

3.3.3.1 Alternative 1
Based upon the research of the Navy (SCSC) ecologist, no threatened or endangered species are known to occur at this location. Additionally, the Virginia Department of Agriculture and Consumer Services, Division of Consumer Protection stated that no threatened or endangered plant or insect species have been documented in a nearby project area (letter dated December 16, 2003; see Appendix D).

3.3.3.2 Alternative 2
Based upon the research of the Navy (SCSC) ecologist, no threatened or endangered species are known to occur at this location.

3.3.3.3 Alternative 3
There are no known protected species at this location. There was a single piping plover nest half a mile to the north of Alternative 3 in 2004. Due to the lack of available mudflats in the vicinity of Alternative 3, this area is not likely to be attractive to the birds.

3.3.4 Pest Control

Due to the sensitivity of the island environment, pesticide use is minimized. No insecticides are used on the island. Rodenticide (~10 oz/yr) currently is used in existing structures as needed and is placed within tamper-proof bait stations within the buildings. Treatments with herbicide approved for use in wetlands (sodium glyphosate) are currently utilized for *Phragmites* control and is hand applied on an as-needed basis. Biological controls of biting insects have proven more effective than chemical controls, and will be utilized for the DD(X) facility. Examples are swallow boxes to attract mosquito-eating birds (swallows) and chemical-free greenhead fly traps. Biological controls have not increased the likelihood of bird strikes to existing site buildings. The swallows forage over the parking lots and around the open access areas adjacent to the site buildings. Both security lights and the presence of humans attract the mosquitoes, on which the birds feed. They prefer these open spaces; boxes placed near vegetated areas have not attracted the same species.

3.3.4.1 Alternatives 1-3
Other than existing biological controls for biting insects and herbicides used as-needed for *Phragmites control*, there no methods of pest control currently utilized at any of the potential Site Alternatives.

3.4 Socioeconomic Environment and Environmental Justice

Wallops Island is located in Accomack County on the Eastern Shore of Virginia. This is an economically depressed area; the average per capita income is $16,309 (U.S. Census Bureau, Census 2000). NASA is one of the largest employers in Virginia’s section of the Eastern Shore and is the main center of high technology. Other major employers are the poultry industry, agriculture, commercial fishing, and tourism.

The environment is quiet, the lifestyle rural and generally conservative, and the population relatively stable. Although the number of retirees moving into the area is increasing, many younger people tend to move away because of lack of suitable job opportunities.

Besides Chincoteague, which is the largest and wealthiest community in the county (population approximately 4,317 in 2000), the main population centers in the area are Pocomoke City, MD (population approximately 4,098) 20 miles (32 km) to the north, and Salisbury, MD (population approximately 23,743) 40 miles (64 km) to the north. The closest community, Atlantic, VA, (population approximately 1,100), is only about 5 miles (7.5 km) from Wallops Island.

3.4.1.1 Alternatives 1-3

There are no differences between the three potential Alternative Sites with regard to socioeconomic environment and environmental justice.

4 ENVIRONMENTAL CONSEQUENCES

4.1 Land Use

4.1.1 Historical and Current Land Use

Today, WFF continues to support advanced engineering developments. Land use on Wallops Island is, for many years has been, and can be expected to remain, compatible and complementary to the proposed action. No significant change to the tempo or kind of activities currently underway at Wallops is expected as a result of this project.

Because the radiation pattern and characteristics of the proposed radar are very similar to the radiation pattern of the AN/SPY-1 radars, no additional interference is expected.

Just as flashlights spread light outside the main beam, some radars experience sidelobes, or a scattering of energy outside the main beam. These sidelobes are the most likely source of cumulative interference with other emitters. Since the DD(X) and SPY-1 radars have very little sidelobes, there is very little energy except in the beam itself. Therefore augmentation, or additive properties of the radiation, is not a problem. Since the beams come from sources physically separated, the only place the beams from the DD(X) and other nearby sources could augment would be at or near a target being tracked by multiple beams. Since targets are normally well outside the radiation hazard zone, where the energy from each beam is minimal, even at the target itself augmentation should never become a problem. Hence the impact of additional radars on the island is expected to be minimal. Any interference problems would be solved by cooperation among the emitting projects, oversight by NASA, and at worst, periods of radar silence. These procedures are in place at present and have worked well.

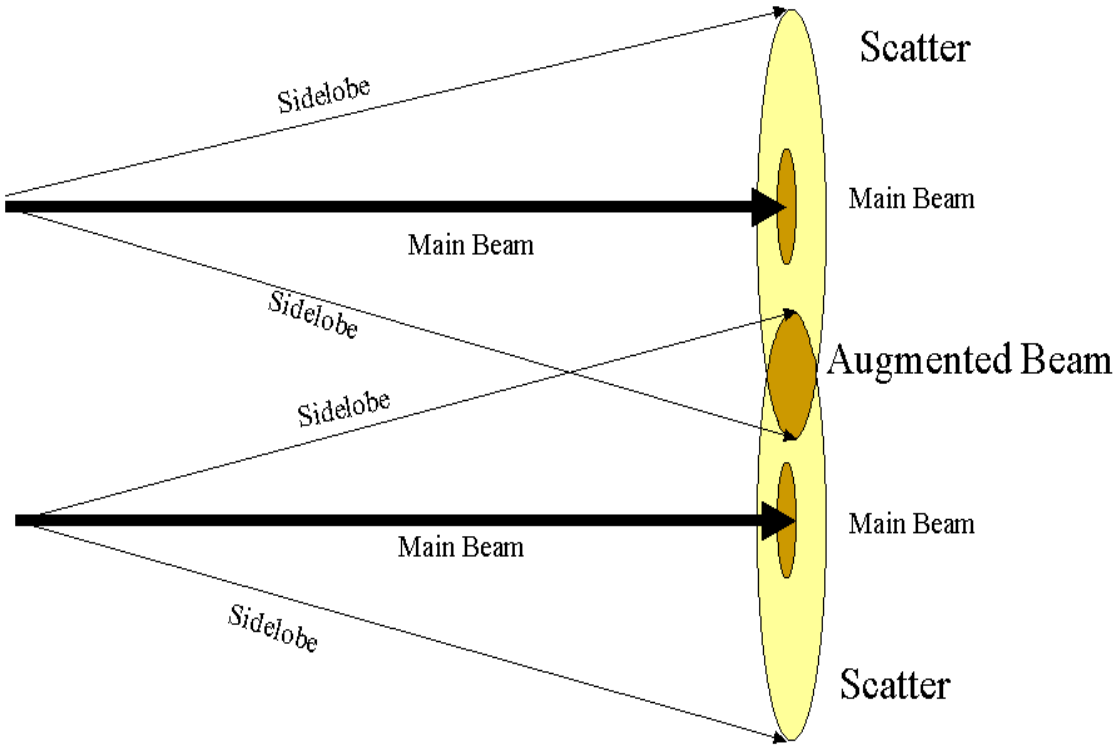

Figure 9: Augmentation Caused by Scatter From Large Sidelobes.

The only impact observed to date has been potential Hazards of Electromagnetic Radiation to Ordnance (HERO) associated with NASA rockets on the pad and during transport directly in front of the facility. These are infrequent events and are readily resolved through established interagency coordination procedures that require radar silence during these events. No ordinance is stored in the vicinity of any of the alternatives.

HERO potential stems from the functional characteristics of electrically initiated ordnance. The ordnance Electro-Explosive Devices (EEDs) may be accidentally initiated or their performance degraded by exposure to RF environments. In general, ordnance is most susceptible during assembly, disassembly, handling, loading, and unloading. HERO is the result of absorption of electromagnetic energy by the firing circuitry of EEDs. RF exposure can, in the worst case, cause premature, unintended, actuation of the EED, or can cause chemical changes within the explosive material resulting in

either increased or decreased sensitivity. Such RF interaction with EEDs can cause both safety and reliability problems. EEDs used on the NASA rockets at WFF perform functions such as deploy fins, light rocket motors, separate rocket stages, or other vital functions. Some of the systems handled at Wallops Island have been qualified as HERO SAFE or HERO SUSCEPTIBLE by Navy or Air Force testing. Systems which have not been tested, or which have known vulnerabilities to electromagnetic energy, are classified as HERO UNSAFE.

Navy criteria for HERO are established in Ordnance Publication (OP) 3565, based on average radiated power density over a relatively short time period as opposed to the longer time periods used for HERP. The acceptable levels of radiated power density depend on the specific type of ordnance being subjected to the electromagnetic field. Many of the rockets and missiles used by NASA at Wallops Island and transported along the road are listed in OP 3565. Where rockets and missiles are not listed in OP 3565, a worst case is used and they are assumed to be HERO UNSAFE.

The SPY radars do not actually rotate; rather, the radar system electronically “steers” the emitted beam from the antenna in the direction determined by the associated computer program. Under normal circumstances, radar beams are transmitted in different directions from the previous beam. Under certain special testing conditions of the radar (manual beam steering), the beam can be directed in a fixed position causing a substantial portion of the radar’s available energy to be radiated in one direction for short periods of time. These special, controlled conditions represent the worst possible case and are used for determining potential HERO.

The Naval Ordnance Safety and Security Activity (NOSSA) conducted a HERO survey of Wallops Island on 2 DEC 2003. Actual RF measurements were used to determine the potential HERO restrictions in accordance with the established Navy and Industry standards previously discussed. The results of this survey are detailed in the NOSSA report entitled “Hazards of Electromagnetic Radiation to Ordnance Assessment of AEGIS Combat Systems Center Wallops Island, VA” dated 12 Feb 2004". The recommendations made in this report are normally followed at SCSC at present and will continue to be observed by the DD(X) facility as noted below.

The AN/SPY-1 radars are operated with SCSC specific adaptation data that prevents transmission of beams below the horizon. The operating characteristics of the planned DD(X) DBR radars will be generally the same, particularly when considering

possible HERO and HERP at Wallops Island. Operation of the AN/SPY-1 radar systems with high power is included under "normal operating condition."

The only risk area which was found to potentially exceed the HERO levels for unprotected ordnance was the transport roadway directly in front of Buildings V-10/V-20 when the AN/SPY-1A and the ANSPY-1B were operating in anything other than low power. SCSC does not anticipate Hazards of Electromagnetic Radiation to Ordinance (HERO) restrictions with the new DD (X) Facility. The radars will be installed least 60 feet above the ground and will not radiate below 0 degrees. However, a complete HERO analysis of the installation will be conducted when all radiating elements are installed on the facility. As an added precaution, Navy radars are normally secured when NASA moves HERO-susceptible or HERO-unsafe ordinance on the island. Additionally, a study was performed on the existing Multi-Function Radar, which is expected to be the strongest radar on the DD(X) building and HERO approval was granted provided safe separation distances and HERO Emsission Control Procedures be followed. No hazard to personnel is predicted below the elevation at which the radar transmits (>60 feet).

The AN/SPS-49 radar is also a potential HERO risk for the transport roadway. The proposed radars would potentially provide a similar risk to the roadway in front of the building. In accordance with established procedures with host agency NASA, SCSC at present takes the added precaution of silencing all emitters whenever any uncontainerized ordnance is scheduled to transit along the roadway in front of Buildings V-10/V-20. The same procedures would be in effect for transit in front of the proposed DD(X) site. Due to controls currently in place, no impact to ordnance is expected.

For the radars on the proposed DD(X) facility, potential HERP would be expected to exist only at or above 60 feet (18.3 m) above the ground within specific radii from the antennas in the direction of radiation out to a maximum of 2,800 feet (852m).The radiation pattern is depicted in Figure 10. The radiation hazard is 60 feet (18.3 m) above the ground because the software that operates the radar beams automatically blanks out any transmissions below 0 degrees elevation. No stray radiation exists below the beam at levels which could present a hazard to ordnance or to any living thing, as was confirmed by the E^3 review.

The radiation hazard zone, depicted in Figure 10, represents a worst case condition of continuous wave, which is a condition

wherein the beam is radiated in a fixed position at a high power level for a limited length of time during the final flight phase of a missile to facilitate terminal homing. Although it is a special, short-term condition, it represents the absolute worst case and is used in determining the maximum potential HERP range. In reality it would be extremely unlikely to be radiating in that mode for long enough periods of time to put sufficient average power on personnel — but it serves to set an absolute worst-case boundary.

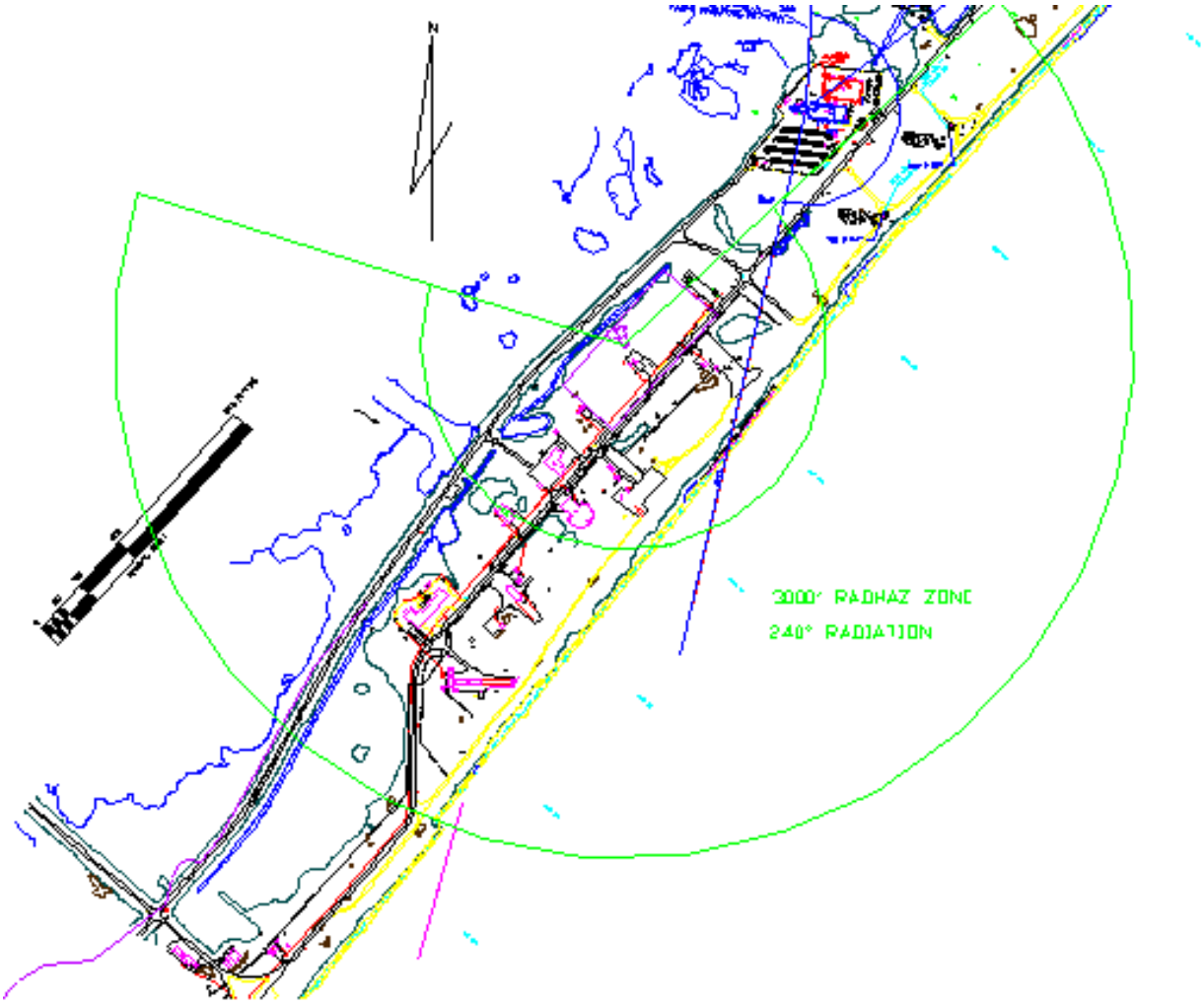

Figure 10. Propjected Radiation Hazard Zone at Wallops Island.

A guard at the entrance to the causeway controls access to Wallops Island. Only badged employees or personnel escorted by a badged employee can gain access to the island. Signs warning of potential radiation hazard are posted anywhere that workmen could conceivably penetrate the hazardous area (e.g. towers or roof tops). It is therefore unlikely that there would be an accidental penetration of the potential hazard area on the island.

The airspace around Wallops Island is restricted to planes. Restricted Area R-6604 is controlled by the NASA Control Tower. When they are not on duty, usually at night, control is turned over to the Patuxent Naval Air Station. Both the NASA Control Tower and Patuxent Naval Air Station are informed of all events on the island which might impact aircraft. These events include but are not limited to launch events, flyovers during tests, and radar activities. Any planes approaching the restricted area are warned away unless they are participating in an ongoing event. It is therefore very unlikely that personnel in airplanes could accidentally wander into this controlled airspace and be exposed to the radiation hazard zone.

The only other potential penetration would be from the water, which is not controlled. In the marsh, there is the Intracoastal Waterway, a marine path that permits boat traffic to travel north and south along the Delmarva Peninsula, but within the protection of the barrier islands. Although this waterway is occasionally dredged, it remains shallow, normally less than 10 feet (3 meters). The waterway is slightly within the Radiation Hazard Arc, but no vessel is likely to be large enough to support personnel 60 feet (18.3 m) in the air, where they could be exposed to hazardous radiation.

The ocean itself is the other avenue of approach by marine craft, but it is also shallow. The potential radiation hazard zone would extend 2,000 feet (610 meters) from the shore. At that distance, the ocean is normally between 10 and 15 feet (3.0 to 4.5 meters) deep. Currents, tides, and storms cause significant variations in this depth. For any person aboard a vessel to penetrate the radiation hazard zone, that person would have to be at least 60 feet (18.3 m) in the air. The probability that a vessel could be large enough to sustain a person at that height, and yet sail into such shallow waters, is extremely remote. The County of Accomack reached the same conclusion (see Appendix D).

In conclusion, the only personnel likely to penetrate the proposed radiation hazard zone are workers at Wallops Island itself. There are well-established procedures, including both training and physical lock-out, to prevent such penetrations.

4.1.1.1 Alternative 1
Based upon the above information, Alternative 1, at W-40, should represent no use impact to Wallops Island, farms, nor to Assateague or Chincoteague Islands during construction and operation.

4.1.1.2 Alternative 2
Based upon the above information, this Site Alternative should represent no use impact to Wallops Island, to farms, nor to Assateague or Chincoteague Islands during construction and operation.

4.1.1.3 Alternative 3
Alternative 3, the northernmost alternative, should represent no use impact during construction. Additionally it represents no use impact to farms. There would be no impact to Assateague and Chincoteague Islands from ships or planes working with the proposed facility during operation because these assets are normally out to sea in the Virginia Capes Operating Area. Planes can not fly over Assateague Island, especially during the Piping Plover breeding season, as noted in Section 4.3.3. Since many targets will be "targets of opportunity", meaning vessels or airplanes already operating in the vicinity, impacts from these operations are expected to be minimal at worst. There are normally a few planes (about a dozen) each year which work close to the AEGIS radars. As the AEGIS line ages, it will be replaced by the DD(X) line of ships. Thus the few planes now working with the existing facilities will gradually be replaced by a similar number working with the proposed facility.

4.1.1.4 Alternative 4
This alternative represents no use impact to historical and current land use during construction and operation.

4.1.2 Areas of Unique Significance
No impact is foreseen to any of the unique areas from construction and operation of the proposed action due to the distances from all three alternative locations. From the Visitor Center at Assateague National Seashore, the proposed building may be visible with optical equipment regardless of alternative site chosen. No other impact is anticipated. Although there are abundant farmlands on the mainland adjacent to the project site, there would be no impact to these lands.

4.1.2.1 Alternative 1
Alternative 1 should represent no impact to farms or to Chincoteague and Assateague Islands. Although visible from Assateague, a building at this site would not stand out since other, similar buildings currently exist in the vicinity.

4.1.2.2 Alternative 2
Alternative 2 should represent no impact to farms or to Chincoteague and Assateague Islands. Other buildings in the area would lessen the visual impact at this site.

4.1.2.3 Alternative 3
Alternative 3, the northernmost alternative, should represent no impact to farms. There may be some slight impact to Assateague, due to visibility of the facility to tourists utilizing the resort areas. The building would stand out more at this location due to its greater proximity to Assateague and due to the lack of similar buildings in the vicinity. Since the Visitor Center, from which the building would be visible, is 4.5 miles away, the impact would be minimal. Additionally, if the proposed facility becomes too visible, security would be lessened.

4.1.2.4 Alternative 4
Alternative 4 represents no impact to areas of unique significance.

4.1.3 Cultural Resources
There are no known areas near any of the proposed project sites which are significant to any Native American groups.

As noted in the Federal Coastal Consistency Determination Response Letter dated December 16, 2003 and provided in Appendix D, review of the proposed activity by the Department of Historic Resources found that the project has the potential to affect architectural and/or archaeological resources listed in or eligible for the National Register of Historic Places. Therefore the Navy is legally required under Section 106 of the National Historic Preservation Act to consult with Department of Historic Resources. The only sites of historic significance are the Coast Guard station located on Wallops Island and the Scout Program Office, located nearly a mile south of Alternative 1. The field just north of the Coast Guard station is proposed for use as a wetland mitigation site, as noted in Section 4.2.8. Although an archeological survey of the 1.1-acre proposed for use as a wetland mitigation site resulted in the identification of one previously unrecorded archaeological site (44AC459), the VA

Department of Historic Resources determined it not to be a significant historic resource (see Appendix D, May 25, 2004).

An architectural and archaeological resources study was performed for WFF (*Cultural Resources Assessment of Wallops Flight Facility, Accomack County, Virginia*, November 2003). Regardless of the Alternative chosen, in the event that cultural resources are inadvertently encountered during construction, work will cease and VDHR will be contacted.

4.1.3.1 Alternative 1
After reviewing Alternative 1 and the associated proposed wetland mitigation areas, the Virginia Department of Historic Resources (VDHR) has determined that neither this project (letter dated February 9, 2004; see Appendix D) nor the mitigation for wetland impacts (letter dated May 25, 2004; see Appendix D) would have an effect on prehistoric or historic properties.

4.1.3.2 Alternative 2
NASA's Cultural Resources Assessment did show this area as having a moderate sensitivity for historic resources and a high sensitivity for prehistoric resources. Consultation with the Department of Historic Resources would be required if this Alternative were selected.

4.1.3.3 Alternative 3
Based upon NASA’s Cultural Resources Assessment, there is no evidence to suggest this Alternative may impact cultural resources. Consultation with the VDHR may be required if this alternative were selected, prior to action.

4.1.3.4 Alternative 4
Alternative 4 represents no impact to cultural resources.

4.1.4 Hazardous Material Contamination

Per the Environmental Baseline Survey, neither the DD(X) Site Alternatives, nor the proposed wetlands mitigation areas are likely to contain soil or water contamination (Sue Fields, NASA WFF Restoration Project Manager). Surveys of the island have failed to detect any reason to expect any form of contamination at the Site Alternatives or the proposed wetlands mitigation sites.

If any sign of contamination should be discovered during construction, it would immediately be brought to NASA's attention for remediation.

Normal precautions required during construction and use should prevent contamination of the surrounding area, and, therefore, the proposed action will not create an impact due to hazardous material contamination regardless of the alternative chosen. Should any release occur, NASA maintains a response unit on the island which should prevent contamination of adjacent lands or waters.

4.1.4.1 Alternative 1
There is no visible evidence of contamination at this Site Alternative. Programs are in place to manage and control hazardous material contamination. Spills are promptly and professionally cleaned by NASA, the landowner. The new building will be included in this system.

An aerial view of the site shows a sandy open field at the same location in September of 1977. Mr. Hank Rajala, who has worked in W-40 since 1984, remembers the open field at the same site ever since his arrival. He believes it lacks trees due to periodic mowing. Thirty soil cores were taken at random locations within the open field, to a depth of six inches. None showed any discoloration of the soil or had any unusual odor. No spills are known to have occurred here, as no facilities for hazardous material storage or utilization are known to have been present here.

4.1.4.2 Alternative 2
Per NASA's Environmental Baseline Survey, there is no evidence of possible contamination.

4.1.4.3 Alternative 3
Per NASA's Environmental Baseline Survey, there is no evidence of possible contamination.

4.1.4.4 Alternative 4
Selection of this alternative allows for no means of hazardous material contamination to be impacted.

4.2 Physical Environment

4.2.1 Physiography and Soils
Regardless of the potential site location, due to excavation and grading of the proposed 5-acre site during construction, an Erosion & Sediment Control Plan will be developed by the Contractor and submitted for approval before construction commences. Therefore, once the site is stabilized through best management practices, there will be no lasting negative effects to physiography or soils due to this action.

4.2.1.1 Alternative 1
Alternative 1 lies between the ocean and the marsh. It is located in a dune/swale ecosystem at a natural elevation of less than five (5) feet (1.5 m). An Erosion & Sediment Control Plan has been reviewed and approved by the Department of Environmental Quality as part of the Joint Permit Application process discussed further in Section 4.2.8 Wetlands. There will be no lasting negative effects to physiography or soils due to this action.

4.2.1.2 Alternative 2
Alternative 2 is located in an interfingered area where ridges are adjacent to wetlands. The result is a hummocky topography with numerous small wetlands surrounded by higher areas as well as long, low areas leading out to an extensive brackish wetland. If this Alternative were selected, an Erosion & Sediment Control Plan would be required by the Contractor and submitted to the DEQ for approval before construction proceeds.

4.2.1.3 Alternative 3
This site is located on dunes. The alternating dunes and swales create a varied topography. If this Alternative were selected, an Erosion & Sediment Control Plan would be required by the Contractor and submitted to the DEQ for approval before construction proceeds.

4.2.1.4 Alternative 4
This alternative provides no impact to physiography, or to soils.

4.2.2 Floodplains
Regardless of the Site Alternative selected, construction would require the building will be placed on a surcharged substrate with cement pilings, as all of the Site Alternatives are located within a 100-year floodplain. Since the pilings would be cement, the only impact from them would be by slow leaching of calcium carbonate, which tends to raise the soil pH slightly. Since plants do not grow at these depths, there will be no anticipated impacts to plants or animals.

The base for the pilings will be a surcharged soil substrate. Soils move because the water leaches out under pressure. By piling up large amounts of soil (35,000 m^3) on an area, considerable pressure can be imposed. Permanent wicks, made of a polypropylene core and filter, then pull the water out of the fill material. The excess pore water would be conveyed horizontally outside of the surcharge area via a system of drain tile, geotextile fabric and permeable aggregate placed

on the existing grade and below the fill and building foundation. This layer will provide hydrostatic relief and base stability in addition to drainage. The excess soil would be removed and the area graded to the required level before construction. The stabilized area would support the facility weight on a shallow foundation. The weight of the building itself would keep tension on the soils, forcing any infiltrating water up the wicks and away from the structure. The area will also be level with the first floor of the building, providing access to loading docks and entrances. Water wicked from compacting soils during construction would flow into the adjacent wetlands. The opening size of the filter material typically ranges from about 0.1 to 0.2 mm, meaning that very fine sand and silt and clay particles could theoretically pass through the filter. This is less than half of the opening size of silt fence. Due to the pressures generated by the process and the filters, the water is likely to carry minimal particulates. Water discharged from buildings constructed in similar fashion in the past has shown no turbidity. There is no known source of contamination for this neither water, nor are there any wells using water at this level. All sources of potable water are deep wells located on the adjacent mainland, about two (2) miles (3 km) away. Since the additional soil will come from nearby sources (< 5 miles, < 8 km), no contamination or unusual materials are expected to be introduced. This discharge will be addressed in the Stormwater Pollution Prevention Plan, which will be prepared by the Contractor, and will be covered by the Virginia Pollutant Discharge Elimination System (VPDES) General Permit for Stormwater Discharges from Construction Activities.

The source for the substrate material shall be provided from the proposed wetlands mitigation area, also located north of the proposed fill area. In addition, source material shall be provided from a borrow pit on the mainland. The borrow pit shall be determined by the contractor. The fill volume includes additional fill, which will be removed after the site is surcharged.

The fill required for surcharging and site grading shall be tested to determine the maximum dry density, optimum moisture content, natural moisture content, gradation and plasticity for material acceptance before filling operations begin. In the contract specification, satisfactory materials shall consist of sandy soils with a maximum of 25 percent particles finer than the No. 200 standard U.S. sieve, and classifying as

group SM, SP-SM, SP or SW by ASTM D 2487. The non-organic soils in the mitigation area should meet these requirements.

Within the immediate drainage area there are 6400 acres (2600 hectares) of saltmarsh wetlands. Total impervious surface development on the island by all agencies is less than 50 acres (20 hectares). Therefore the addition of impermeable surface to this overall amount is not significant, either for this project or cumulatively. The proposed action will create approximately 2.24 acres of impervious surface.

Similar foundation structures would be required regardless of the location of the building. None of the sites on Wallops Island would experience significant impact to floodplains due to the flat topography and the vast overflow storage capacity adjacent to the island. Therefore, the project complies with Executive Order 11988, “Management of Floodplains,” by design.

4.2.2.1 Alternative 1

During storms, wave action from the sea is limited by a rock seawall roughly 800 ft. away. Water can also wash in from the bay, often with destructive effects. This flow is likely to be minimal until the water overflows the roadway behind the site. At that point, a sheet of water will crest over the road, flowing toward the sea. In many hurricanes, this flow is highly destructive. Any concentration of this flow would increase its speed and hence destructive capacity. The physical presence of an additional structure on the island would not significantly concentrate the floodwaters or decrease storage capacity for overflow because of the large adjacent undeveloped areas during construction and operation. The floodwaters are likely to be constrained by built-up roads north and south of the site. Within those constraints, the building would represent an impervious face of 0.08% of the distance between the roads. This would not be a significant impediment. Floodwaters would flow around the structure and into the same water bodies which receive them today.

4.2.2.2 Alternative 2

This area is better protected from overwash during storms due to its distance from the sea (>1000 ft) and the presence of a rise of about five feet between the ocean and the site. Behind the site is an extensive marsh which would be subject to flood and overwash during storms. There are no constraints for these floodwaters; the addition of a building in this area would not represent a significant loss of floodwater absorption capacity during construction and operation.

4.2.2.3 Alternative 3
This area is the best protected from overwash during storms due to its greater distance from the sea (about 1200 feet). This is an area of active accretion, meaning that distances to the open ocean will continue to increase over time. The presence of elevated roads and an extensive wetland behind the site would limit the probably of overwash from the marsh. The building would not represent a significant impediment to floodwater movement during construction and operation.

4.2.2.4 Alternative 4
This alternative provides no impact to or from floodplains.

4.2.3 Water Quality

The existing VA DEQ Ground Water Withdrawal Permit, Number GW 0039300, allows the withdrawal of 13.3 million gallons per year. At present, 9 million gallons are used annually. Projections for this project indicate an annual usage of 0.480 million gallons per year. Current supplies are therefore expected to be sufficient.

There are no industrial discharges on the island, so no stormwater permit is required. However, a permit for stormwater run-off during construction will be required. The application will be submitted to the Virginia Department of Environmental Quality.

All three possible sites on Wallops Island would use the same water source and feed into the same force main for sewage. Rainwater from Alternatives 1 and 2 would run to Bogues Bay; rainwater from Alternative 3 would run into the Atlantic. Stormwater from all three might enter the Atlantic Ocean. In each case, pollution of groundwater supplies would be nearly impossible. Pollution of surface waters will be addressed in the Stormwater Pollution Prevention Plan, which will be prepared by the Contractor, and will be covered by the Virginia Pollutant Discharge Elimination System (VPDES) General Permit for Stormwater Discharges from Construction Activities. Therefore, the proposed action will not impact the surface water quality on Wallops Island.

Since the potable groundwater is 150 to 265 feet (45 to 80 meters) deep, and since the recharge zone for the groundwater in the area is over the spine of the peninsula, roughly six (6) miles (9.5 km) away, there would be no impact on the quality of the potable groundwater.

No designated wild or scenic river is close enough to the proposed site to be impacted.

4.2.3.1 Alternative 1

On the ocean side, storm floods could impact the site, potentially washing construction silt into the Atlantic. The normal sedimentation controls required under Virginia erosion and sediment control regulations should prevent any significant movement of materials during construction. No impacts to and from the flood zone are expected during operation.

An erosion and sedimentation control analysis of the existing conditions and redevelopment conditions was conducted. The following control measures will be provided, should this alternative be selected:

- Temporary Stone Construction Entrance
- Silt Fence
- Storm Drain Inlet Protection
- Culvert Inlet Protection
- Outlet Protection
- Rock Check Dams
- Tree Preservation and Protection

One temporary stone construction entrance will be designed for the site to reduce the amount of mud transported onto paved public roads by motor vehicles or runoff.

Silt fence will be utilized on the site to intercept and detain small amounts of sediment from disturbed areas during construction operations in order to prevent sediment from leaving the site.

Storm drain inlet protection will be applied to the site at all proposed storm drain inlet locations to prevent sediment from entering storm drainage systems prior to permanent stabilization of the disturbed areas.

Culvert inlet protection will be applied to the site at all proposed culvert inlet locations to prevent sediment from entering storm drainage systems prior to permanent stabilization of the disturbed areas.

Outlet protection will be designed for all pipe outlets within the project area. Maximum tail water conditions will be assumed for all situations.

Additionally, one bioretention basin and a grassed swale will be used to filter the water from the parking lot.

4.2.3.2 Alternative 2
There is at present no ditch in the vicinity of Alternative 2. Stormwater is most likely to enter Bogues Bay via the saltmarsh lying west of the site. An erosion and sedimentation control analysis of the existing conditions and redevelopment conditions would be required if this alternative were selected.

4.2.3.3 Alternative 3
Due to extensive wetlands west of the site, stormwater runoff is not likely to reach the bay except by percolation through groundwater. During storm events, runoff could enter the Atlantic directly due to high tides and heavy runoff. An erosion and sedimentation control analysis of the existing conditions and redevelopment conditions would be required if this alternative were selected.

4.2.3.4 Alternative 4
Selection of this Alternative provides no impact to water quality.

4.2.4 Air Quality

Wallops Island is an Attainment area for all Criteria Pollutants; no change to that status is anticipated. The only new emissions expected would be from the heating boiler, temporary exhaust from the construction equipment, and vehicle emissions from employees. Boiler emission levels will be added to NASA's State Operating Permit for the Mainland/Wallops Island (Regulatory Number 40909 AIRS and Identification Number 51-001-0031). This is a minor change; NASA does not anticipate any difficulties.

During construction activities, Virginia Regulations 9 VAC 5-50-60 et seq. and 9 VAC 5-40-5600 et seq. shall be adhered to concerning fugitive dust and open burning, respectively. It should be noted that open burning will not intentionally occur, as it is not a planned construction activity. Therefore, the proposed action will not adversely impact the air quality on Wallops Island during construction and operation.

4.2.4.1 Alternatives 1-3
The boiler emissions will be 1M BTU unit regardless of the Alternative Site selected. The air permit is issued to and maintained by NASA. Per NASA's air emissions manager, the only requirement will be an additional line to their existing permit.

There will be a slight increase in dust and engine exhaust during construction, and exhaust from employee and visitor engines, along with boiler emission levels during operation. This increase will be negligible and is not expected to adversely impact the air quality on Wallops Island. These impacts should be the same regardless of the Alternative site chosen. Therefore the proposed action will not adversely impact the air quality on Wallops Island.

4.2.4.2 Alternative 4
Selection of this Alternative provides no impact to air quality.

4.2.5 Noise

The proposed construction activities will generate short-term, temporary noise from earthmoving equipment. Noise levels generated are expected to be minimal and not audible by any sensitive receptor regardless of the site chosen on Wallops Island.

During operation, SCSC usually uses targets of opportunity at existing facilities, which means that most noise producers are already present. The ships and aircraft they do work with are normally in the VACAPES OPAREA, two miles or more at sea. Therefore any increase in ambient noise would be temporary and minimal at the most. Therefore, there will be no significant impacts from construction and operation of the proposed facility.

4.2.5.1 Alternatives 1-3
Regardless of the Alternative Site selected, the anticipated noise level during construction will be approximately 90 to 105 dBA at a distance of 50 feet and will not impact a sensitive receptor during construction and operation.

Construction will occur during daylight hours. The Contractor's working hours shall conform to the regular working hours of the Navy Inspection Section, which are 8:00 a.m. to 4:30 p.m., except where authorized by the NGOSPM in accordance with FAR Clause 52.236-15--Schedules for Construction Contracts (Apr 1984), to exceed the Schedule limitations. Should the Contractor desire to work outside of these hours, a written request shall be made in advance, to the NGOSPM. The Navy Public Works Representative may authorize emergency deviations to the Contractor's work schedule. No work shall be performed without such approval. In addition, no work will be performed on Government observed holidays unless authorized.

Construction is scheduled for about three months, from January through March of 2005, and fourteen months during the second phase of construction, to be completed in May 2006.

4.2.5.2 Alternative 4
Selection of this Alternative provides no noise impacts.

4.2.6 Wastes

All wastes, regardless of site chosen, will be managed as wastes are managed at other Navy facilities at Wallops Island. Therefore, no negative impacts are anticipated due to the proposed action.

Anticipated wastes will predominantly be commingled municipal waste and will be similar to that at the current Navy facilities with similar functions. Some hazardous waste related to facility operation and maintenance will be generated at the proposed site, over half of which are expired materials, engine maintenance, or cleaning. One third are fluids changeout, especially from the radars. The rest are byproducts of activities such as lubrication, cleanup, etc.

Each Navy site at Wallops has a hazard minimization center, where hazardous materials are stored. After use, the material or its container is returned to the center. Materials which are determined to be waste are stored in a Satellite Accumulation Area at the center itself. These Areas are checked at least twice a year by NASA to assure compliance with all hazardous waste regulations. NASA removes wastes, storing and disposing of them in compliance with hazardous waste regulations and their permit. Should any material be released, NASA has a response unit which cleans up and disposes of any released material. This process would be required regardless of location.

4.2.6.1 Alternatives 1-3
No impact from waste is anticipated during construction and operation, regardless of the Alternative Site selected.

4.2.6.2 Alternative 4
This alternative provides no impact from waste.

4.2.7 Coastal Zone

The island has been used for many years for projects and programs similar in nature and impact to the proposed action. No change in the current use of the coastal zone is proposed.

The Coastal Zone Management Act (CZMA) requires Federal agencies to determine whether their activities affecting any coastal use or resource be undertaken in a manner that is consistent to the maximum extent practicable with the

enforceable policies of approved coastal management programs. For any activity determined to affect any coastal use or resource, an agency must submit a consistency determination for review by the appropriate State agency.

4.2.7.1 Alternative 1
The open ocean lies less than 0.2 miles (0.33 km) from this site. A rock seawall has been placed along the shoreline in front of the site, to retard damage from storm events. Due to the presence of the seawall, there are no dunes in the central portion of Wallops Island. As a result, the proposed action will not impact any dunes during construction and operation.

The Virginia Department of Environmental Quality has concurred with the Navy's determination that this project is consistent to the maximum extent practicable with the Virginia Coastal Resource Management Program (letter dated December 16, 2003; see Appendix D), provided all applicable permits and permissions are obtained prior to action.

4.2.7.2 Alternative 2
Site 2 does not have the seawall before it, but is located in the maritime forest and would not impact the dunes during construction and operation. No consultation with the State has been completed for this site.

4.2.7.3 Alternative 3
Site 3 would be located on or adjacent to dunes. Precise negotiation with NASA would be required to determine exact location of the facility and associated access. It is likely that several acres of dunes would have to be leveled. Impact to these wild dunes could occur during construction and could require consultation with the State to determine permit requirements.

4.2.7.4 Alternative 4
Selection of this Alternative provides no impact to coastal use.

4.2.8 Wetlands
Regardless of Site Alternative selected, wetlands would be impacted and would require mitigation. Since OPNAVINST 5090.1 states "The Navy will comply with the national goal of no net loss of wetlands," mitigation will be required. A Joint Permit Application must be submitted to the United States Army Corps of Engineers, Virginia Marine Resources Commission, and VADEQ. Construction would not begin until the permits are issued.

4.2.8.1 Alternative 1

The proposed construction would require filling and grading 2.1 acres of wetland. Mitigation would involve construction of at least 3.2 acres of scrub/shrub wetland on the northern part of Wallops Island. Since there is a probability that *Phragmites australis* (common reed, an invasive alien abundant on Wallops Island) will invade the site, 4.5 acres of wetlands will be created to assure that at least 3.2 acres meet the requirements of the permitting agencies (Army Corps of Engineers and Virginia Department of Environmental Quality). The building location would be on a wetland.

Accordingly, a Joint Permit Application has been submitted (see Appendix E). On November 3, 2004 the draft JPA permit was published to begin the public notification and 30-day comment period. Construction of the mitigation site is expected to begin in January of 2005, in concert with the construction of the proposed Site.

Although this is a wetland, it is low only in comparison to the relative uplands around it. It is possible that this area was originally upland, but filling for buildings and roads more than half a century ago has rendered it a wetland. The main hydrologic function would be to absorb runoff from adjacent areas. These are now mowed lawn containing structures considered either obsolete or of low value. Other wetlands in the area will also continue to absorb runoff, as will the stormwater ditch running along the bayside edge of the area. The change in hydrologic function caused by building in this wetland is not considered significant.

The flow rate is minimal through the potential construction area of Alternative 1. Water from adjacent higher sites flows onto the proposed site, and thence into a man-made drainage ditch before emptying into a man-made gut leading to Cat Creek and thence to Bogues Bay. This movement is very slow due to the lack of significant elevation changes. No significant sources of water pollution exist "upstream" of the area. Though a building and associated parking area is adjacent, there is rarely more than one or two cars associated with the site. Any water quality functions of the area are not significant. Since the site is being filled, it will no longer absorb runoff from adjacent areas. Grassed swales will be used as a broad and shallow earthen channel vegetated with erosion resistant and flood-tolerant grasses. The purpose of the grassed swales is to convey storm water runoff at a non-erosive velocity in order to enhance its water quality through infiltration, sedimentation, and filtration. Check dams will be incorporated. Grassed swales will provide some peak

attenuation depending on the storage volume created by the check dams. Additionally, one bioretention basin and a grassed swale will be used to filter the water from the parking lot. The existing ditch and pond located along the edge of the site will also be used as a storm water management pond. The analysis of the existing pond shows that there is adequate capacity to treat the DD(X) site.

In addition, the 300-foot (91-meter) meteorological (met) tower just south of the proposed site will need to be moved. The new location will be 1.7 miles (1.1 km) south of the current site, in a patch of *Phragmites* dominated wetlands. Roads abut the area on three sides. The projected impact is to an area of roughly 4,000 square feet, 1/10 of an acre (1219 square meters, .04 hectare). This area will be included in the mitigated acreage. The building itself must be on the wetlands area due to the physics of radar emissions, satellite reception, hazards of interference with other emitters in the vicinity, requirements of building size and shape, and security buffers. Nonetheless, the parking areas can and will be sited so that the available uplands will be utilized to the

Figure 11. Wetlands on the Alternative 1 DD(X) Site.

maximum extent possible.

It should be noted that the current effort is not expected to impact the entire 2.9 acres (1.2 hectare) of wetlands. Up to 2.1 acres (0.84 hectare) will eventually be utilized. There will be a road impacting small areas (<0.1 acres, <0.04 hectare) of wetlands, and the new met tower is likely to impact 0.1 acres (0.04 hectares) of wetlands; a total of less than 0.2 acres (0.08 hectare) of miscellaneous disturbances. The wetlands being impacted are a dune/swale *Morella cerifera* (wax myrtle) habitat. Under US Army Corps of Engineers guidance, for each acre of wax myrtle wetlands impacted, 1.5 must be created. Accordingly, mitigation efforts will seek to replace up to 2.1 acres, which when multiplied by 1.5, equals 3.2 acres (1.28 hectare) of mitigation wetlands. To ensure that 3.2 acres meets permit standards, a total of 4.5 acres of wetlands will be created. See Appendix E for the Joint Permit Application.

4.2.8.2 Alternative 2
Site 2 includes a mixture of wetlands, some under tidal influence, and mature maritime forest, which would be difficult to recreate on a mitigation site. Use of this site would require a new Joint Permit Application. Due to the difficulty of reproducing the quality of wetlands and mature maritime forest, mitigation measures would be more difficult to accomplish. Negotiation with United States Army Corps of Engineers and Virginia Department of Environmental Quality would be required to determine acreage of wetlands impacted and acreage of wetlands required for mitigation.

4.2.8.3 Alternative 3
Although Site 3 has the fewest wetlands, it does include prime wild dunes. In addition to the Joint Permit Application, the Navy may be required to obtain permission from the Virginia Marine Resources Commission to build on prime wild dunes. Negotiation with United States Army Corps of Engineers and Virginia Department of Environmental Quality would be required to determine acreage of wetlands impacted and acreage of wetlands required for mitigation.

4.2.8.4 Alternative 4
Selection of Alternative 4 provides no impact to wetlands.

4.3 Biological Resources

4.3.1 Plant Communities

The only commitment of natural resources for this project would be the removal of a small (5 acres, 2.0 hectares) area

of the plant community. Where the impacted community was wetland, it would have to be mitigated.

4.3.1.1 Alternative 1
This site is located within the predominant dune/swale community. One third of the site is upland, some of it mowed lawn. Construction of the proposed project will require the removal of a 2.1 acre wetland and associated vegetation. A new 3.2 acre wetland with associated vegetation will be created in accordance with the requirements of the United States Army Corps of Engineers and the Virginia Department of Environmental Quality.

4.3.1.2 Alternative 2
Site 2 is located in a mature maritime forest of loblolly pine, interfingered with tidally-influenced *Spartina* (saltmarsh hay) wetlands. This habitat would be difficult to reproduce in a mitigation area. Roughly 20 years are required for the dominant loblolly pine (*Pinus taeda*) to reach maturity in this habitat.

4.3.1.3 Alternative 3
Site 3 is at the edge of the dunes in a bayberry (*Morella pensylvanica*) shrub habitat, which would not be easily mitigated due to the sensitivity dune habitat. The dominant bayberry (*Morella pensylvanica*) takes roughly 10 years to reach maturity in this habitat.

4.3.1.4 Alternative 4
Selection of this Site provides no impact to plant communities.

4.3.2 Invasive Species
Native vegetation will need to be installed at the edges of the project and at the wetlands mitigation site to prevent invasion of *Phragmites* or other alien species. With the installation of native vegetation at the project site and the mitigation site, the proposed action will not impact current invasive species control methods used on Wallops Island, regardless of site location.

4.3.2.1 Alternative 1
Under Alternative 1, 3.2 acres of wetlands are required to be created to mitigate for impacts to existing wetlands on the site. As part of the Department of Environmental Quality permit, *Phragmites australis* can not exceed 37% of the cover on the accepted wetlands. Therefore, control will be continuous until stability is reached. A total of 4.5 acres

of mitigation wetlands will be created to assure that 3.2 acres comply with regulatory requirements.

4.3.2.2 Alternative 2
A Joint Permit Application would have to be submitted for this site for wetlands mitigation. Negotiations with the United States Army Corps of Engineers and Virginia Department of Environmental Quality would be required to determine acreage of wetlands impacted and acreage of wetlands required for mitigation.

4.3.2.3 Alternative 3
Construction in this area would create conditions conducive to alien plant invasion, especially *Phragmites*. Control efforts would be required to prevent its establishment in the disturbed areas.

4.3.2.4 Alternative 4
Selection of this Alternative provides no impact from invasive species.

4.3.3 Wildlife Species and Habitat

Over the last 12 years, less than two dozen birds per year are believed to be killed by flying against the walls of the two existing large Island facilities. Since the other buildings in the same area experience 3 to 12 deaths a year, it is possible that up to 12 impact deaths per year will also be experienced at the new building. These were mostly grackles, an abundant resident bird, and blackbirds, also abundant residents. Other species less commonly found include gulls and rails. A depredation permit, which would allow lethal control of wildlife including raptors, was held by the SCSC Ecologist from 1988 through 1997. In 1998, the permit was allowed to lapse because it had not been used during the decade it was in place. It has not been needed since. The impact deaths have not included hawks and falcons.

Additionally, Bald Eagles only nest on the mainland and are occasionally observed on the island, but not in the vicinity of any of the Alternative Sites. No impact is foreseen. Although Raptors do fly along the dunes during migration, at Wallops Island most typically turn inland to hunt over the marsh. Those which migrate past the proposed sites are moving low and fast, and unlikely to receive a harmful radiation dose.

Guards who patrol the perimeters of existing buildings estimate an annual impact kill of three to a dozen birds per building. Most of the migratory species pass at high

elevations, over the marsh and mainland behind Wallops, or at sea[3]. Shorebirds tend to fly low along the beach, away from any of the three proposed sites. Birds following the dunes or center of the island, and hence most likely to be impacted by this project, are mostly tree swallows, rails, and raptors (mostly hawks and falcons). Tree swallows migrate well above the 135 ft elevation of the building, but do feed in the adjacent scrub-shrub habitat. By maintaining a clear space around the building with no vegetation, impact hazard to swallows will be minimized. In addition, the windows will be tinted, not reflective. Since window impact is believed to be caused by reflections resembling sky or habitat, the tinted windows and the lack of nearby habitat to reflect should reduce this hazard. Rails migrate at low elevations, but mostly at night. Only two individuals are known to have struck the existing buildings in the 20 years they have stood; one of those recovered. No raptors of any kind have been found dead from impact.

Figure 12: View of the Proposed Building From the Southern Side

[3] Personal communication, Irvin W. Ailes, Certified Wildlife Biologist, head biologist of Chincoteague National Wildlife Refuge

Even for the birds flying south in the fall, which are the birds at greatest risk of impact fatalities, the building would be clearly visible. The least visible section to a bird, and hence the highest risk, is the windows. From the northeast, which is the direction from which the migrants approach, the windows are a small portion of the building and hence are not likely to present a significant hazard (see Figure 12).

Most of the birds at Wallops would be unaffected by this project with regard to affects from the radar operation itself. The presence of the parking lot and building, with the associated human activity, will reduce habitat in the immediate vicinity of the project. However, the proposed 1.5 wetland acres to replace each wetland acre impacted will provide significant new habitat. These new wetlands will be built in an area more favorable for wildlife use. There are extensive saltmarsh wetlands adjacent to the site, and a mix of upland maritime forest and scrub/shrub wetlands in the vicinity. These factors, and the minimal human use in the area, will further improve the quality of the habitat being created.

Based on past practices for mosquito and insect control, nest boxes for swallows will probably be installed as mosquito control. Swallows nesting along the fence would tend to hunt at levels well below the radiation hazard level, as they do at other Navy facilities on Wallops Island. Before the construction of Navy facilities in the mid-1980's, there were very few swallows on the island. The highest recorded count, outside fall migration, was on April 25, 1971, when 50 tree swallows were recorded by Charles Vaughn. Most of these did not nest on the island. The birds were first attracted to the area in the mid-1980s by the installation of nesting boxes along Navy fencelines, as a biological mosquito control. By contrast, on May 27, 2004, the 40 available nesting boxes were all in use. Three of these boxes contained house wrens, and the rest were tree swallows. This is an estimate of 74 nesting adults. A minimum of 15 chicks were observed, but additional chicks were probably present as well as many nests still containing eggs. Even considering only the adults with nests, this is a significant increase in the number of nesting birds in the vicinity of the Navy facilities, despite the existing risk of impact with the building and the existing

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and Wallops National Wildlife Refuge 1979-2003 (retired).

radiation hazard zone above them. At present, each of the nesting boxes normally produces one to three broods of young per year. While the majority are tree swallows, other birds attracted to the site for nesting include purple martins, barn swallows, and house wrens. The rapid increase of the population around the Navy buildings indicates that any negative effects of impacts with the building or the radiation zone overhead have been negligible.

Numerous neotropical migrants both breed and migrate along the islands. They tend to forage and nest in vegetation which grows well below the radiation hazard area. During migration, they tend to fly well above the hazard area. There is an occasional death from impact with the buildings. Guards patrolling the Navy facilities estimate three to twelve a year for each facility, but there is a large raccoon population in the area which may remove some bodies from around the buildings and towers. Nonetheless, an average of less than a dozen impact fatalities a year at each facility is a good estimate. There has been no known occasion when numerous deaths resulted from impacts with buildings or towers on the island. It may therefore be assumed that the addition of the DD(X) facility and its associated windows and towers will pose some hazard, especially to migrating birds, but that the hazard will not be significant. It is possible that the large number of towers and masts on the island alert the birds to the presence of these structures, resulting in fewer collisions. In that case, Alternative 1, with an abundance of buildings and towers in the vicinity, represents the least hazard while Alternative 3, which would stand virtually alone in an otherwise wild area, represents the greatest hazard.

Guy wires are known to be a major source of collision hazard for birds, in part because the wire's small size and minimal lighting reduces visibility. None of the towers planned for the DD(X) facility will be over 100 feet tall, and none will use guy wires. However, the NASA meteorological tower does have guy wires. Due to interference with the proposed radars at Site 1 on Wallops, this tower will have to be moved as part of this project if this site is accepted. With more modern designs available, the new tower will not include guy wires. As a result, the hazard this tower poses will actually be reduced from present levels.

Most migrants fly along the spine of the Peninsula. Some flocks of waterbirds migrate either at sea or along the marshes. Tree swallows, rails, and raptors (hawks and falcons) normally migrate along the shore. Tree swallows move by day, often feeding along the way. Although there have been

some impact deaths, they have been minimal. Rails migrate at night and at lower elevations. Again, there has been some loss to impact, but only two cases are known in the 20 years the AEGIS building has been in place. The fall migration of raptors, mostly hawks and falcons, flows south along the barrier islands and potentially places a large population of birds at risk of interacting with the radars. Impact deaths at the existing Navy structures on Wallops are not known to have occurred in these species.

Raptors migrate through Wallops Island, but at elevations below 300 feet when they are hunting instead of moving quickly to cover distance. When hunting, anything the size of a building would be easily avoided by an animal that uses its eyes to secure food. A James Madison University study of potential impacts from windmills (9/2004) stated that, "[t]he issue of risk to migrating raptors may not be entirely relevant however, because migrating raptors generally do not seem to be at risk of colliding with structures. Collisions of migrating raptors with turbines, communication towers, and other vertical, tall structures are almost unheard of. For example, in Tarifa, Spain, more than 100,000 raptors pass through a large array of turbines each spring and fall, yet very few raptors are killed. Their behavior is almost invariably to fly around the strings of turbines (Kerlinger, personal observations) and large numbers of migrant fatalities have not been demonstrated (Marti Montes and Jaque 1995, Janss 2000)."

To better define migration patterns and hence risks from radiation and impacts, raptor surveys were performed during the fall migrations of 1987, 1996, and 1997 (published in the Environmental Assessment, Upgraded AEGIS Combat System Including the AN/SPY-1D(V) Radar and Support Tower, August 2000). The original data was recalculated for the proposed radar sites and radiation hazard zones for this analysis. Surveys were taken by scanning the horizon in all directions alternately with binoculars and with the unaided eye, and recording the species, location, and time in sight of all birds observed. Surveys taken in 1987 were from a site 0.2 miles (0.3 km) south of alternative site 1, but visibility over the marsh was not good. Surveys from 1996 and 1997 were taken from a site 1.3 mile (2.1 km) north of site 1, with better visibility of the marsh.

Figure 13 shows the shape of the coastline near Wallops, and the pathways of the migrating raptors. The pie chart gives the flight path of raptors at the observation sites on central Wallops Island. The arrows show the flight path; the weight

of the arrows depicts the proportion of birds following that particular path.

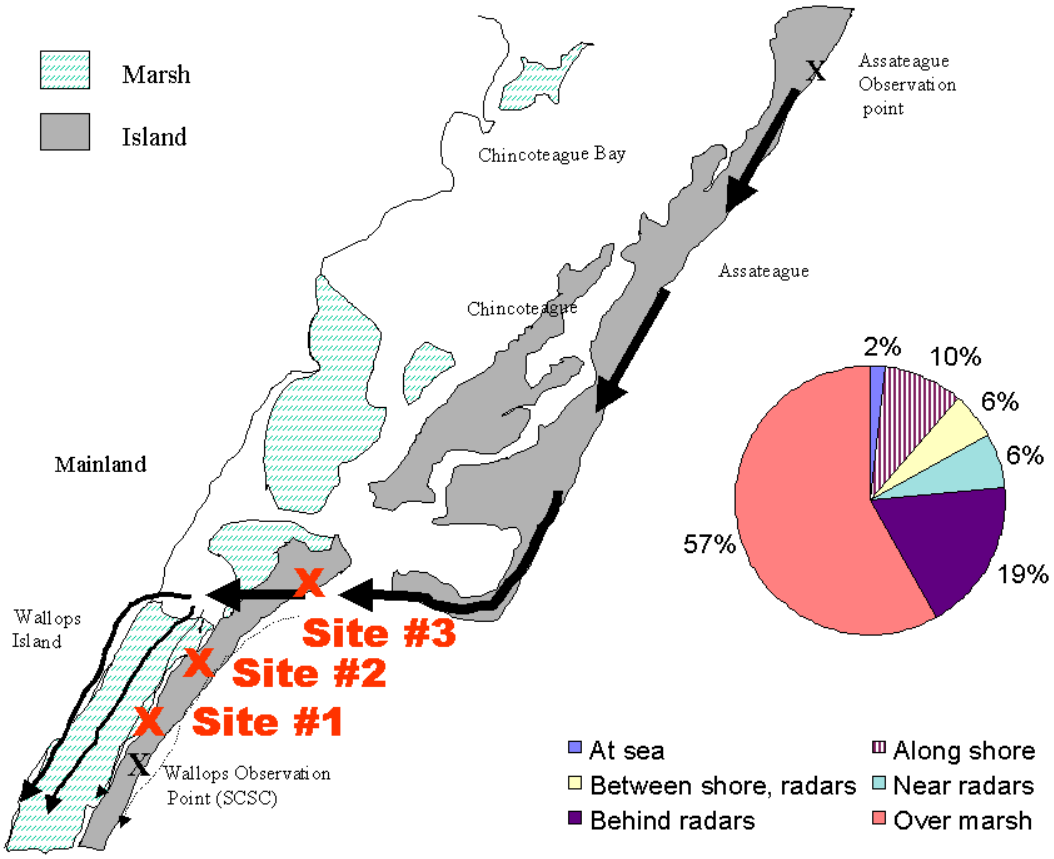

Figure 13. Flight path of migrating raptors (Pie chart shows observed flight path of birds passing the central portion of Wallops Island).

The Chincoteague National Wildlife Refuge performed a raptor watch during 1996 and 1997. Their observation platform is located 10 miles (16 km) northeast of the proposed project site, on the dune line of Assateague Island. At that point Chincoteague Bay, which is mostly open water, lies between the island and the mainland. Birds appear to be concentrated along the dunes, whereas at Wallops Island they appear to be more dispersed. This theory was checked by comparing numbers of birds observed by each station in the same time period. In six simultaneous time periods, an average of 2.9 raptors per hour were observed at Wallops Island, while an average of 6.9 raptors per hour were observed at Assateague Island. This difference is statistically significant (P=0.01). It is therefore concluded that over half (57%) of the raptors

traveling south during migration spread out south of Assateague Island, passing over the marsh, too far from the radars to be visible. Of those close enough to the radars to be visible, 21% passed too far from the radars, to experience radiation hazard.

Thus, of the migrating raptors, only 22% pass near the radars, close enough to potentially be exposed to associated hazards. These birds are migrating; the ones which pause to hunt normally do so too far out over the marsh to be impacted. Those near the radars were never observed to spend more than three minutes in sight, and a much shorter time within the radiation hazard zone. Thus, those few birds which might have been subject to the radiation hazard zones were moving too quickly to receive a harmful dosage. This, coupled with the small size of the birds and the rapid scanning of the radars, makes it very unlikely that any bird would remain in the radar's beam long enough to receive a harmful exposure.

The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing or possessing of any migratory birds included in the terms of conventions established between the U.S. and various countries (16 USC § 703). However, the MBTA exempts from this prohibition incidental takes of migratory birds as a result of military readiness activities, including the testing of military equipment. Nevertheless, as discussed above, it is unlikely that the construction and operation of the proposed facility at any of the alternative sites would result in the taking or killing of migratory birds.

4.3.3.1 Alternative 1

Site 1 would require relocation of an existing meteorological tower. Guy wires can be a hazard to birds, especially during bad weather. The current meteorological tower has six guy wires. Current technology and advances in available materials have enabled the new tower to be built without guy wires. Site 1 would therefore include the removal of an existing wildlife hazard.

The Virginia Department of Conservation and Recreation (DRC) has searched its Biological and Conservation Data System for occurrences of natural heritage resources in the area (see Appendix D). Natural heritage resources are defined by the state as the habitat of rare, threatened, or endangered animal and plant species, unique or exemplary natural communities, and significant geologic communities. According to information in DCR's files, natural heritage resources have not been documented in the project area. Therefore, no significant impacts to wildlife are anticipated at this site.

4.3.3.2 Alternative 2
While located north of Site 1, because Site 2 is located in a maritime forest, no significant impacts to wildlife are anticipated at this site.

4.3.3.3 Alternative 3
Due to the geological shape of the coastline and the migration patterns followed by the birds, impact hazard may increase with more northern sites on Wallops Island. Thus Site 3 could represent a greater hazard to migrants. However, as discussed earlier, impacts with structures below 300 feet is unlikely.

There are no known protected species at this location. There was a single piping plover nest half a mile to the north of Alternative 3 in 2004. Due to the lack of available mudflats in the vicinity of Alternative 3, this area is not likely to be attractive to the birds. Therefore, no significant impacts to wildlife are anticipated at this site.

Alternative 4

Selection of this Alternative provides no impact to Wildlife Species and Habitat.

4.3.4 Federally Protected Species

Radiation from the proposed emitters, like all radiation, weakens with distance. Since the radars will be at least 60 feet (18.3 meters) above ground, the beam will not contact the surface of the sea for about a mile. This is twice the radius of the radiation hazard zone. At the point where radiation contacts the water, therefore, the radiation is far too weak to present a hazard to marine organisms. No radiation strong enough to impact living organisms will be present in the water. Therefore no impact on any animal in the water is anticipated. Therefore, the proposed action is not likely to result in the takes of any marine mammals. Accordingly, a permit under the Marine Mammal Protection Act is not required.

Surveys have been done on Wallops by NASA, Chincoteague National Wildlife Refuge, and the US Department of Agriculture. The Navy (SCSC) ecologist has spent nearly 20 years on the island, doing surveys and monitoring the area. The only listed species found nesting by any of the above is the piping plovers, a threatened species, which nest on the southern and northern edge of the island. No habitat in any of the possible areas is conducive to their use. Bald Eagles nest on the mainland and are occasionally observed on the island, but not in the vicinity of any of the Alternative Sites.

Therefore no listed species has been found by any of the above which might be impacted, regardless of location chosen. Because no threatened or endangered species live, breed, or forage near any of the proposed construction sites, the proposed action will not affect threatened or endangered species. Therefore, the proposed action would have no effect on threatened or endangered species. Accordingly, consultation under Section 7 of the Endangered Species Act is not required.

4.3.4.1 Alternatives 1-3
No threatened or endangered species live, breed, or forage near any of the proposed construction sites, therefore, the proposed action would have no effect on threatened or endangered species. This is true regardless of the Site Alternative selected.

4.3.4.2 Alternative 4
Selection of this proposed action would have no effect on threatened or endangered species.

4.3.5 Pest Control

This action will not impact the current pest control methods utilized on Wallops Island, regardless of site location.

4.3.5.1 Alternatives 1-3
Impacts would be the same at all three alternative sites, since current methods for pest control would be employed at all three sites as needed.

4.3.5.2 Alternative 4
Selection of this Alternative provides no impact from pest control.

4.4 Socioeconomic Environment and Environmental Justice

During construction, from 100 to 200 personnel are likely to be working on the project at any given time. Most of these personnel are not local and this minor increase in population is not expected to be significant.

Impact of roughly 105 additional personnel to operate the DD(X) facility would not be significant. Personnel currently working at the base tend to make their homes in a variety of communities in two states. This trend disperses the impact, rendering the effects in any one location negligible. Thus this minor increase in population is not expected to be significant.

In part due to the rural nature of the area, and in part due to the staggered work hours, traffic delays are very rare. Delays are more often caused by wildlife on the road than by heavy traffic. The addition of the proposed facility is not expected to significantly impact traffic flow or transportation facilities.

The proposed parking lot holds a maximum of 86 cars. It is not expected to be full on a regular basis. Volume will change with the number and type of project underway, it can only be reasonably expected that approximately 45 cars will be the normal daily maximum of vehicles at the site.

While minor, any social or environmental justice impacts that do result from this proposed action would be considered positive, such as a potential place of employment for local residents.

The facility would not be producing any toxic releases which could harm children or adults, either outdoors or within the structure itself.

No farmlands will be impacted.

The population of Accomack County is 32% black, 5% Hispanic, and 63% Caucasian. The proposed action would not adversely impact the human health or the environment of any of the County's populations, including any low-income or minority populations. Therefore, no Environmental Justice analyses are required under Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

4.4.1 Alternatives 1-3

No adverse impacts are expected regardless of site chosen on Wallops Island.

4.4.2 Alternative 4

Selection of this Alternative provides no impact to Socioeconomic Environment and Environmental Justice.

5 CUMULATIVE IMPACTS

5.1 Land Use

5.1.1 Historical and Current Land Use

This project will not change the overall use of the land. However, the closer to the center of the island, the less the cumulative impact will be.

5.1.1.1 Alternative 1
Alternative 1, at W-40, should represent no impact since the area is already surrounded by similar buildings. The proximity of the AEGIS facilities to this location will require blackout of a small portion of the emission arc. This is not a significant concern, and in fact presents a valuable opportunity for interoperability testing.

5.1.1.2 Alternative 2
Alternative 2, north of V-24, should represent some cumulative impact in that it would extend the area where similar buildings are sited.

5.1.1.3 Alternative 3
Alternative 3, the northernmost alternative, would represent the greatest impact. At present, no buildings of this sort and few buildings of any sort are found on this northern area. The cumulative impact would be to open this area to higher utilization later. The extension of utilities would facilitate the development of this section of the island, and the presence of this structure would encourage the addition of other structures in the future.

5.1.1.4 Alternative 4
Alternative 4, if selected provides no cumulative historical or current land use impacts.

5.1.2 Areas of Unique Significance

The greatest cumulative impact to areas of unique significance is likely to be visual impact from the building itself.

5.1.2.1 Alternative 1
There should be no cumulative impact of Alternative 1 if selected. It is in an area where similar buildings already exist.

5.1.2.2 Alternative 2
Alternative 2 should represent minimal impact to Assateague. Although this would be the northernmost of the Navy buildings, it would not stand out as unique.

5.1.2.3 Alternative 3
Alternative 3 would be the most visible from Assateague, both because it would be the only large building in this area and because it would be the closest large building to Assateague.
Alternative 4

Alternative 4, if selected provides no impact to Areas of Unique Significance.

5.1.3 Cultural Resources

5.1.3.1 Alternatives 1-3
No cumulative impacts to cultural resources are anticipated through the implementation of this proposed action regardless of site selection.

5.1.3.2 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to cultural resources.

5.1.4 Hazardous Material Contamination

5.1.4.1 Alternatives 1-3
Programs are in place to manage and control hazardous material contamination. Spills are promptly and professionally cleaned by NASA, the landowner. The new building will be included in this system. Regardless of location selected, no cumulative impacts to hazardous material contamination are anticipated.

5.1.4.2 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to or from hazardous materials.

5.2 Physical Environment

5.2.1 Physiography and Soils

5.2.1.1 Alternatives 1-3
No cumulative impact on the physiography and soils of Wallops Island is anticipated regardless of location.

5.2.1.2 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to physiography and soil.

5.2.2 Floodplains

Wallops Island is surrounded by miles of wetlands. Floodwaters normally result from storms, either hurricanes or northeasters. The waters rise in response to lunar cycle, wind direction, and storm surges. The bays absorb the rising waters until they can no longer retain the flood. At this

point the water floods across the island, normally from the bay to the sea. The presence of buildings can concentrate this flowing water, increasing its speed and hence its destruction. As the island is built up, the increasing number of buildings can increase this effect, causing increasing destruction. To actually cause the effect, however, the buildings must be sufficiently concentrated to restrict the free flow of the water.

5.2.2.1 Alternative 1
This site is most likely to experience the above effect because it is located in the most built-up section of the island. Even here, however, the proposed building would represent an impervious surface of only 0.08% of the distance between the adjacent roads, which could restrict water flow. This would not be a significant addition to floodwater resistance.

5.2.2.2 Alternative 2
There are few buildings in this area. Floodwaters are more restricted by the presence of small hills and old dune lines. Cumulative impact would not be significant.

5.2.2.3 Alternative 3
The presence of dunes would channel floodwaters around the proposed structure. No cumulative impact would be likely regardless of Site selected.

5.2.2.4 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to floodplains.

5.2.3 Water Quality

Regardless of location, surface water quality is not likely to be impacted. Most of the facilities on the island are non-industrial, with the result that there is little likelihood of major discharges, either individually or cumulatively.

Drinking water supplies are sufficient. Cumulative impact is negligible; Wallops Island is the only withdrawal from the aquifer at this site.

5.2.3.1 Alternatives 1-3
If this alternative were chosen, there would be little likelihood to impact water quality, regardless of the Site selected.

5.2.3.2 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to water quality.

5.2.4 Air Quality
Since these facilities are non-industrial, and since the air quality on this sea-swept island is high, the impact from one additional non-industrial building will not be significant.

5.2.4.1 Alternatives 1-3
If this alternative were chosen, there would be insignificant likelihood to impact air quality, regardless of the Site selected.

5.2.4.2 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to air quality.

5.2.5 Noise
The cumulative noise from all activities on Wallops Island is not noticeable. About the loudest sounds are the occasional construction project and the occasional launch or low-flying plane. The proposed facility should not represent a cumulative impact on noise levels.

5.2.5.1 Alternatives 1-3
The proposed facility should not represent a cumulative impact on noise levels, regardless of the Site selected.

5.2.5.2 Alternative 4
If this alternative were chosen, there would be no cumulative impacts due to noise.

5.2.6 Wastes
Sewage wastes are sent to a treatment plant which is well below capacity. Cumulative impact would probably be positive; NASA is currently seeking more input to the plant.

Solid wastes are sent to a landfill nearby. Although the landfill has a finite capacity, the addition of one more facility will not be a significant change to the long-term capacity of the county landfill.

5.2.6.1 Alternatives 1-3
The proposed facility should not represent a cumulative impact from waste, regardless of the Site selected.

5.2.6.2 Alternative 4
If this alternative were chosen, there would be no cumulative impacts due to sewage or municipal waste.

5.2.7 Coastal Zone

The island has been used for many years for projects and programs similar in nature and impact to the proposed action. No overall change in the current use of the coastal zone is proposed. Therefore, no cumulative impact is anticipated to Wallops Island overall. The main cumulative impact is that Wallops Island does not have many sites left where a building of this size could be constructed. Each new facility limits the remaining alternatives. NASA is preparing to mitigate this effect by developing a Master Plan to guide future development.

5.2.7.1 Alternative 1

Since this site is surrounded by other, similar, buildings, no cumulative impact to the coastal zone is likely.

5.2.7.2 Alternative 2

This site should represent a slight northern extension on the area currently utilized by the Navy for similar functions. The cumulative impact would be if the Navy could continue building up this area, but an explosive hazard arc to the north renders this unlikely.

5.2.7.3 Alternative 3

Site 3 would be located on or adjacent to dunes. Impact to these wild dunes could occur and could require consultation with the State. The long-term cumulative impact would be that this would represent the initiation of a new area of intensive human use in an otherwise wild area. It would be possible for future facilities to find this area inviting, resulting in long-term, cumulative impacts.

5.2.7.4 Alternative 4

If this alternative were chosen, there would be no cumulative impacts to the coastal zone.

5.2.8 Wetlands

Wallops Island is a small island interspersed with wetlands, backed by miles of brackish wetlands, and faced by the sea. The loss of a few acres of wetlands is not a significant cumulative impact. Nonetheless, the Navy will be mitigating the loss at a 1 to 1.5 ratio, resulting in an overall gain in wetlands.

5.2.8.1 Alternative 1

This site represents the loss of 2.1 acres of wetlands in an area that is developed by man. However, there will be up to 4.5 acres of wetlands created on the north end in an area where there are now lawns, but where wetlands probably existed

several centuries ago. The cumulative impact would therefore be to return a lawn area to a valuable habitat in an area where the wetland will be a significant benefit to wildlife.

5.2.8.2 Alternative 2
The mix of mature maritime forest and interspersed wetlands in this area is not common along the barrier island chain. Mitigation would be difficult due to the long time period required to produce the mature forest, but there would be no significant cumulative impact.

5.2.8.3 Alternative 3
This site is not on wetlands, so would not represent a significant effect.

5.2.8.4 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to wetlands.

5.3 Biological Resources

5.3.1 Plant Communities

Cumulative impact would depend on the plant community affected.

5.3.1.1 Alternative 1
This site is located within the predominant dune/swale community. Cumulative impact would not be significant because of the abundance of this kind of community.

5.3.1.2 Alternative 2
Site 2 is located in a mature maritime forest of loblolly pine, interfingered with tidally-influenced *Spartina* (saltmarsh hay) wetlands. Mitigation would require construction of a similar habitat in another portion of the island, but there would be no significant cumulative impact.

5.3.1.3 Alternative 3
Site 3 is at the edge of the dunes in a bayberry (*Morella pensylvanica)* shrub habitat. In any area of rapidly accreting shoreline, which this area is, this habitat is common. Therefore, cumulative impact would not be significant.

5.3.1.4 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to plant communities.

5.3.2 Wildlife Species and Habitat

Wildlife is abundant on Wallops Island. Because wildlife is tied to the habitat which supports it, cumulative impact on wildlife will be the same as cumulative impact on habitat.

5.3.2.1 Alternative 1

The abundance of the scrub-shrub habitat on the island, and the creation of 1.5 times the area on the northern section of the island, means that cumulative impact on wildlife should be minimal. There may be a positive effect of moving wildlife away from the center of the island where there is increased human activity, and toward the northern end of the island where human activity is minimal.

5.3.2.2 Alternative 2

Loss of a rare habitat type would represent the loss of the wildlife that utilizes it. Mitigation would require development of the mitigation area as quickly as possible, but there would be no significant cumulative impact.

5.3.2.3 Alternative 3

This area is utilized by migrants crossing from Assateague to the marshes behind Wallops on their way south. The physical presence of a building and the loss of habitat here could be a cumulative impact on wildlife. Mitigation would have to involve creation of new habitat elsewhere.

5.3.2.4 Alternative 4

If this alternative were chosen, there would be no cumulative impacts to wildlife species and habitats.

5.3.3 Federally Protected Species

At present, no protected species utilize any of the proposed Alternative sites. No cumulative impact is predicted except as noted.

5.3.3.1 Alternative 1

No predicted impact.

5.3.3.2 Alternative 2

No predicted impact.

5.3.3.3 Alternative 3

Piping plovers, a threatened species, nested on the north end of the island for the first time in recent history in the summer of 2004. There are no federally endangered piping plovers nesting or foraging in the vicinity of Alternative 3. Nesting habitat at Alternative 3 is not ideal due to lack of available mudflats, where the new chicks prefer to forage. Construction and human activity in that area would tend to

discourage their use of the area. No cumulative impacts are expected with the use of this alternative.

5.3.3.4 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to protected species.

5.3.4 Invasive Species

Any disruption of existing cover represents an invitation to the invasive *Phragmites australis* (common reed). However, any of these alternatives will be landscaped and managed, thus reducing the probability of successful invasion. Cumulative impact may thus be to reduce the population of invasive species, which are currently present on all three sites.

5.3.4.1 Alternative 1
Mitigation agreements require active controls on the mitigation area to reduce the presence of invasive species. *Phragmites* currently represents more than 37% of the vegetation cover at this site.

5.3.4.2 Alternative 2
A Joint Permit Application would have to be submitted for this site. It can be assumed that mitigation would be required and that controls on invasive species would be stringent. Transects have not been done for this site, but *Phragmites* cover is approximately 15%.

5.3.4.3 Alternative 3
Construction in this area would create conditions conducive to alien plant invasion, especially *Phragmites*. Control efforts would be required to prevent its establishment in the disturbed areas. It currently covers roughly 10% of the site.

5.3.4.4 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to species.

5.3.5 Pest Control

No cumulative impact on pest control is anticipated.

5.3.5.1 Alternatives 1-3
No impact from or for pest control is anticipated, regardless of the Alternative Site selected

5.3.5.2 Alternative 4
If this alternative were chosen, there would be no cumulative impacts to or from pest controls.

5.4 Socioeconomic Environment and Environmental Justice

Cumulative impact of this project is minor and positive. The addition of the employees and support functions (janitorial, mechanical, etc. support as well as family support, such as grocery stores and gas stations) will represent a minor positive impact to Accomack County. No mitigation is required.

5.4.1 Alternatives 1-3

Regardless of the Site alternative selected, there would be a slight positive economic impact for the future employees, their families and businesses in the area that they would patronize.

5.4.2 Alternative 4

If this alternative were chosen, there would be no cumulative impacts to socioeconomic environment and environmental justice impacts.

6 REFERENCES

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Virginia Marine Resources Commission
Virginia Department of Agriculture and Consumer Services
Virginia Department of Mines, Minerals, and Energy
Virginia Department of Environmental Quality
- Division of Air Program Coordination
- Waste Division
- Water Division

County of Accomack Department of Building, Planning, and Zoning
Accomack-Northampton Planning District Commission
Chesapeake Bay Local Assistance Department
U.S. Department of the Interior, Fish & Wildlife Service, Ecological Services

APPENDIX A

List of Acronyms

CAA	Clean Air Act
CY	Cycle Year
CZMA	Consistency determination under the Coastal Zone Management Act
DBR	Dual Band Radar
DoD	Department of Defense
DoN	Department of the Navy
EA	Electronic Attack
EED	Electro-Explosive Device
EDM	Engineering Development Model
EEDs	Electro-Explosive Devices
EIS	Environmental Impact Statement
EO	Executive Order
ERD	Environmental Resource Document
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
FY	Fiscal Year
HERP	Hazards of Electromagnetic Radiation to Personnel
HERO	Hazards of Electromagnetic Radiation to Ordnance
ISE	In-Service Engineering

JFMO LANT	Joint Frequency Management Office, Atlantic Office
LSE	Lifetime Support Engineering
MFR	Multi-Function Radar
NASA	National Aeronautic and Space Administration
NAVEMSCEN	Naval Electromagnetic Spectrum Center
NAVSEASYSCOM	Naval Sea Systems Command
NAWC	Naval Air Warfare Center
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NITA	National Telecommunications and Information Administration
NOAA	National Oceanic and Atmospheric Administration
NOSSA	Naval Ordnance Safety and Security Activity
NSWC	Naval Surface Warfare Center
OP	Ordnance Publication
OPAREA	Operations Area
OPNAVINST	Office of the Chief of Naval Operations Instruction
PEL	Permissible Exposure Limit
PEO	Program Executive Office
RADHAZ	Radiation Hazards
RF	Radio Frequency
SCSC	Surface Combat Systems Center
SSD	Ship Self Defense

SSDS	Ship Self Defense Systems
TEMPEST	[not an acronym] Unclassified US government code word for compromising emanations; now called Emissions Security or EMSEC
T&E	Test and Evaluation
UHF	Ultra High Frequency
VACAPES	Virginia Capes
VHF	Very High Frequency
VSR	Volume Search Radar
WFF	Wallops Flight Facility

APPENDIX B

National Environmental Policy Act Documentation Worksheet

Description of action (name of project): _____

Person in charge of action or SCSC Project Coordinator[4]:
Name: _____ Phone Number: _____

Date: _____

Short narrative description of action or project (if action impacts any area outside a facility fenceline, attach a site plan[5]):

Yes	No	
☐	☐	1. Is construction required? a. Anticipated date of construction: _____ b. Note on the attached site plan for the action any alternatives you may be considering.
☐	☐	2. Will this action be confined entirely within the Navy fence, with no anticipated disturbance to other areas?
☐	☐	3. Does this action involve any change in the support structure required? (e.g. change in traffic patterns, utility services, phone lines, etc.)
☐	☐	4. Does this action require a permit from any other agency, including NASA?
☐	☐	5. Does this action involve a change from current land or facility use?

[4]The SCSC Project Coordinator or other individual overseeing an action is responsible for reporting all known impacts, including those created by contractors, to the Public Works Ecologist. Significant changes in planned or ongoing operations which may impact the human or natural environment will require the submission of a new Documentation Worksheet.
[5]This form will be considered incomplete without a site plan unless all impacts will be confined to current structures.

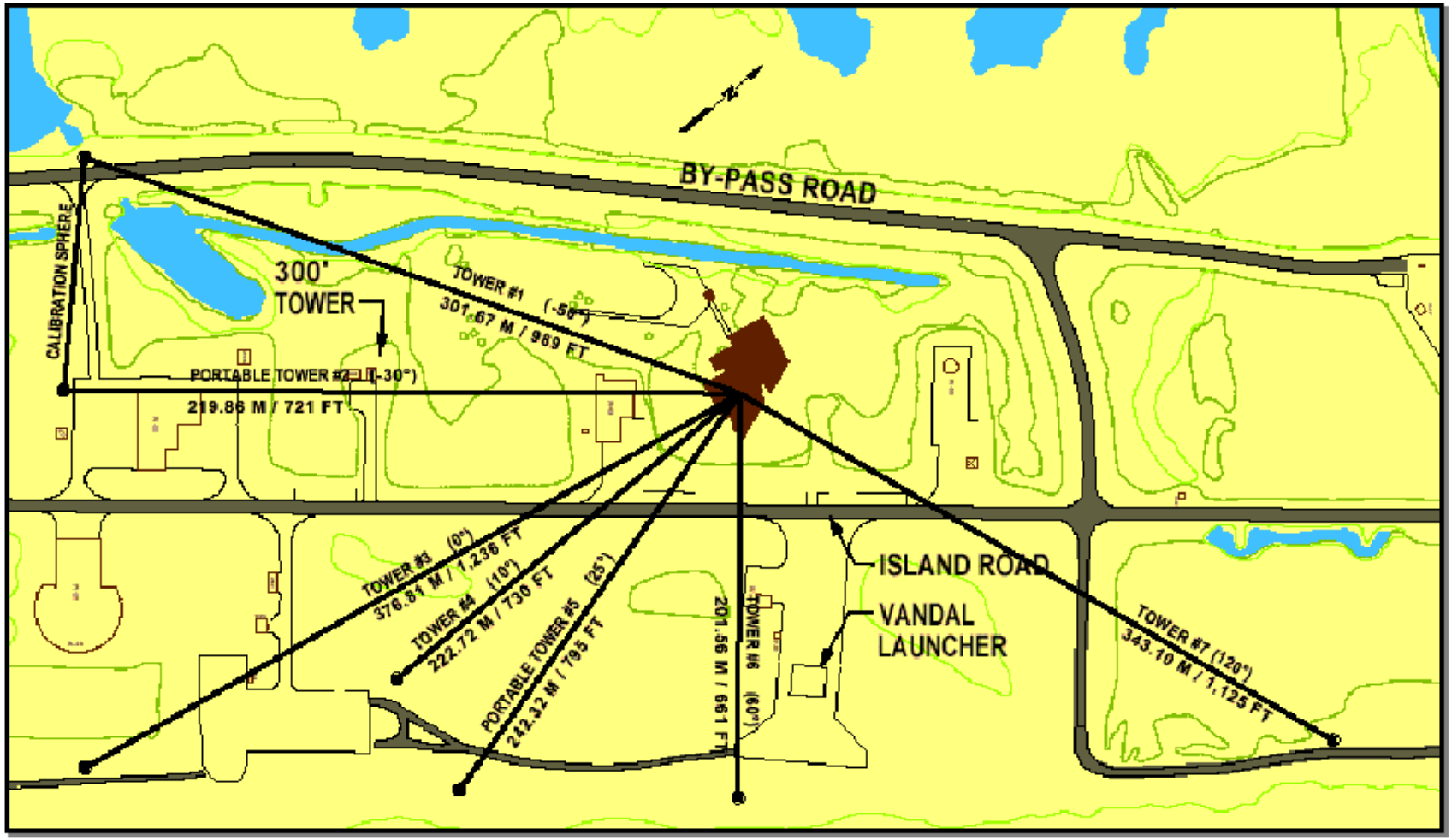
NEPA Documentation Worksheet, Continued

Yes	No	
☐	☐	6. Is there any potential for contamination of air or water?
☐	☐	7. Could any impact of this action be considered controversial?
☐	☐	8. Will this action emit radiation? If no, proceed to question 9.
☐	☐	a. Will there be a change in the radiation patterns described in the SCSC Radiation Hazard Plan?
		b. During normal operations:
☐	☐	(1) Could a hazard to personnel exist at less than 70 feet above the ground?
☐	☐	(2) When the beam is directed toward the horizon, is the radiation at the shore line sufficient to present a hazard to personnel?
☐	☐	(3) Is there a radiation hazard area west of the site?
		c. If the emitter should malfunction:
☐	☐	(1) Could a hazard zone extend more than 3850 feet from shore?
☐	☐	(2) Could radiation on the ground at the shore represent a hazard to personnel?
☐	☐	d. In the event of malfunction or unplanned penetration into the hazard area, would it be difficult to turn the beam off quickly?

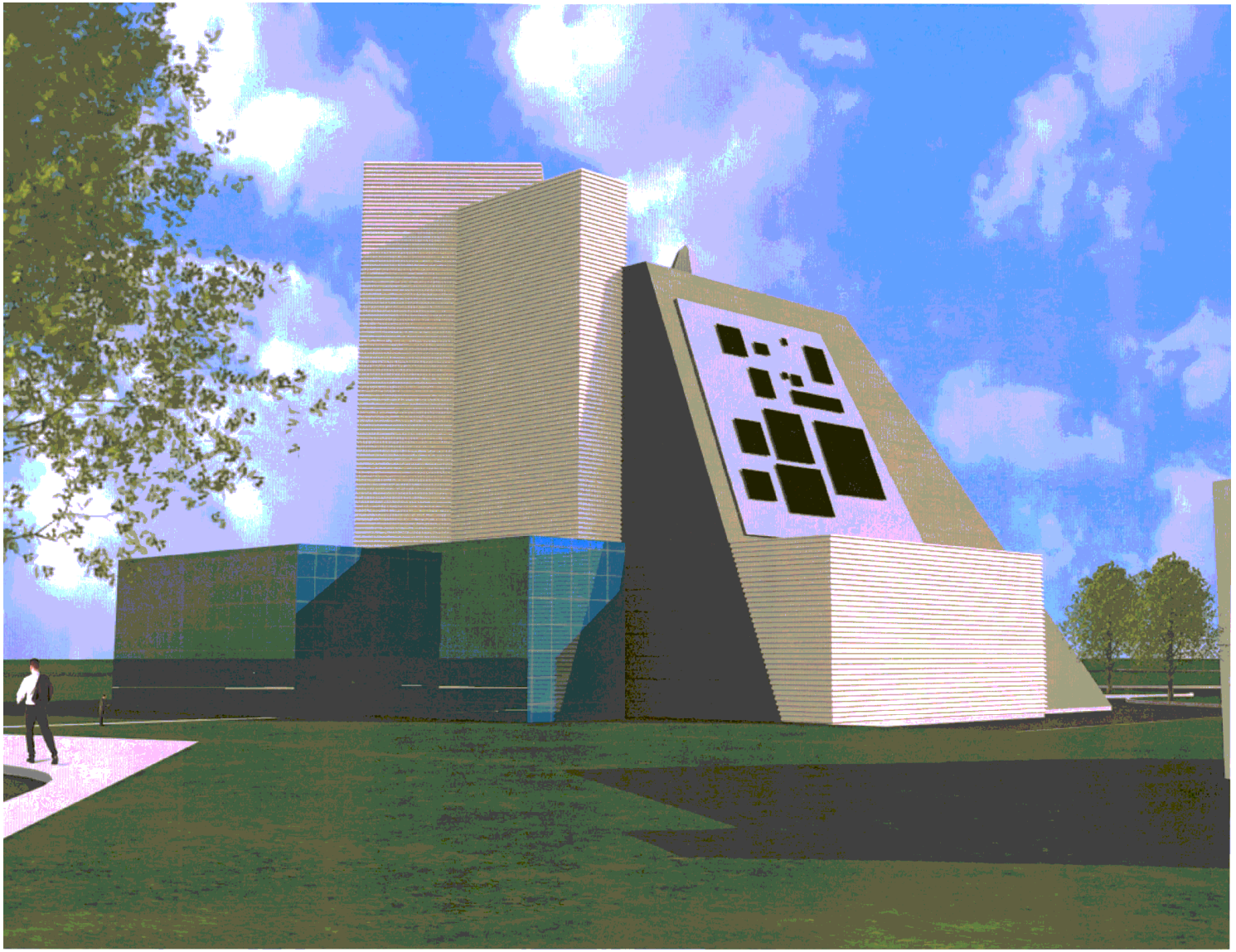
9. Do you know of any impacts this project or action will have on the environment, either human or natural (i.e. pacemaker or traffic interference, waterway restrictions, wetland impacts, etc.)? If so, please describe:

APPENDIX C

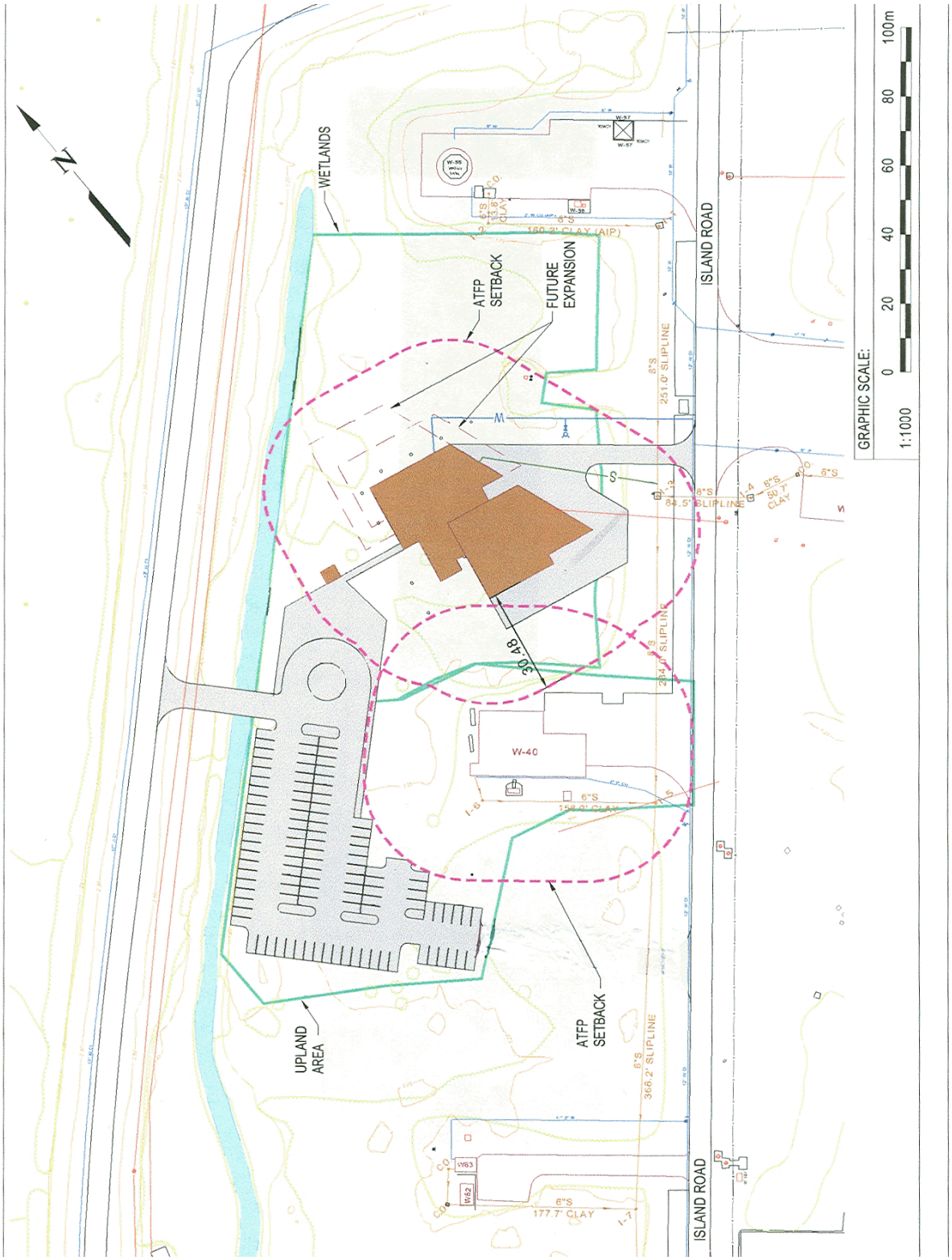
Proposed Site Plan



Site plan showing location of poles.



Artist's concept of building looking northward.



DD(X) Site Plan

APPENDIX D

Consultation Letters

Potential deficiencies noted by Virginia and locations addressed in the EA are as follows:

Solid and hazardous wastes, pollution prevention: 3.5.6
Contamination Control: 3.4.3
Pesticides: 3.6.5
Natural Resources: 3.6.2
Historic Resources: 3.4.2
Erosion & Sediment Control: 3.5.1

NOTE: On April 6, 2004 Dr. Ailes (SCSC) spoke by phone with Ellie L. Irons (EIR Program Manager, Virginia Department of Environmental Quality). Dr. Ailes explained that we had learned that wetlands would be impacted, and hence mitigation would be required. Ms. Irons stated that no further submission would be required, since the State would be reviewing the Joint Permit Application.

APPENDIX E

Final FWP Individual Permit